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8 April 1986

CHINA REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

PEOPLE'S REPUBLIC OF CHINA

NATIONAL DEVELOPMENTS

U.S. Strategic Defense Initiative Reviewed
(Zheng Zhiren; HANGKONG ZHISHI, No 2, Feb 86) 1

Vice Minister Reviews Electronics Industry
(Zhang Zuedong; Beijing Domestic Service, 2 Mar 86) 6

Science, Technology Association Outlines Plan
(Zhang Jimin; XINHUA Domestic Service, 17 Feb 86) 8

Goals Stated for Future Beijing S&T Development
(Chen Zhiqiang; BEIJING KEJIBAO, 22 Jan 86) 10

Major S&T Projects Produce Favorable Economic Results
(GUANGMING RIBAO, 19 Jan 86) 12

Recent Successes for S&T Integration With Production
(Chen Zujia; RENMIN RIBAO, 14 Feb 86) 14

China Achieves Success in World S&T Markets
(RENMIN RIBAO, 15 Dec 85) 16

Results of Major Projects Have Positive Impact on Production
(RENMIN RIBAO, 1 Jan 86) 17

Numerically Controlled Miller Successfully Manufactured
(Qing You; JINGJI RIBAO, 29 Jan 86) 19

Conference on Combining Research, Production Held in Dalian
(Ruan Bingsen, Chen Zujia; RENMIN RIBAO, 17 Dec 85) 21

Effects of Rising Number of Integrated Operations Noted
(HEBEI RIBAO, 21 Dec 85) 23

Principles for Importation, Use of Technology Suggested
(Yi Hui; GUOJI MAOYI WENTI, No 6, 1985) 25

Science Funding System Benefits Basic Research
(Wen Zhenshun; GUANGMING RIBAO, 27 Dec 85) 36

Restructuring of S&T System Brings Good Results
(HEBEI RIBAO, 7 Jan 86) 37

Renovation of Existing Enterprises Urged
(JISHU SHICHANG BAO, 3 Dec 85) 39

National Defense Industries Stress Civilian Products
(Peng Ziqiang; GUANGMING RIBAO, 24 Dec 85) 41

Emergence of Civilian S&T Development Enterprises Described
(Xiao Guan'gen; RENMIN RIBAO, 1 Feb 86) 43

Role of S&T Consulting Work Discussed
(Zhao Yingchun; KEYAN GUANLI, No 4, Oct 85) 45

Higher Institutions in S&T Markets Discussed
(Tao Weijiang; KEXUEXUE YU KEXUI JISHU GUANLI, No 11,
15 Nov 85) 51

Hubei Acting Governor Addresses Scientific Education Meeting
(Hubei Provincial Service, 2 Mar 86) 54

Reforms in Defense Industry Research Institutes
(Liu Fohua; KEYAN GUANLI, No 4, Oct 85) 56

Open Door Policy for S&T Institutes Successful
(Ren Xinfa, Wang Yougong; RENMIN RIBAO, 27 Jan 86) 63

Survey of Science Research Institutes Released
(XINHUA, 11 Mar 86) 65

Criticisms of S&T Situation in Higher Institutions
(Tao Xinliang; KEXUEXUE YU KEXUE JISHU GUANLI, No 11,
15 Nov 85) 66

Suggestions for Reform of College S&T Research
(Shuai Xiangzhi; KEXUEXUE YU KEXUE JISHU GUANLI, No 11,
15 Nov 85) 71

Briefs
Electronics Plants Transferred 76
Japanese Computer Joint Venture 76
Jiangsu Computer Application 76
Controlling Electronics Imports 77
Jiangsu Electronics Industry 77
Number of Science Institutions 77

APPLIED SCIENCES

State of Acoustics Development by Year 2000 Discussed
(Guan Dinghua; WULI, No 9, Sep 85) 78

LIFE SCIENCES

Health Care Improves for Women, Children
(XINHUA, 8 Mar 86) 84

Briefs
Tianjin Animal Breeding 85
Shanghai Institute System To Test Cells 85
Hunan Unit Studies Chromosome Diseases 85
JIEFANGJUN BAO Notes PLA Hospital Research 86
Electronic Device Helps Paralysis Victims 86

ENVIRONMENTAL QUALITY

Guangxi City Works To Fight Pollution
(XINHUA, 28 Feb 86) 87

Hunan Introduces Rural Environmental Protection
(XINHUA, 8 Mar 86) 88

ABSTRACTS

SOLAR ENERGY

TAIYANGNENG XUEBAO /ACTA ENERGIAE SOLARIS SINICA/, No 4, Oct 85 89

TAIWAN

First Epitaxial Firm Begins Production
(CNA, 30 Dec 85) 90

Cabinet Approves VLSI Project; Task Force Named
(CNA, 16 Jan 86) 91

Executive Yuan Approves VLSI Joint Venture
(CNA, 18 Jan 86) 92

Synchrotron Center Planned for Northern Taiwan
(CNA, 3 Feb 86) 93

NATIONAL DEVELOPMENTS

U.S. STRATEGIC DEFENSE INITIATIVE REVIEWED

Beijing HANGKONG ZHISHI [AEROSPACE KNOWLEDGE MAGAZINE] in Chinese No 2, Feb 86 pp 10-12

[Article by Zheng Zhiren [6774 3112 0068]]

[Text] The U.S. "Star Wars" plan is currently a topic of great controversy and an issue for heated debate among different nations, particularly between the two superpowers and the Western European countries.

With regard to the "Star Wars" plan, people are concerned not only about its contents, but more importantly, they are concerned with the following questions: What is the United States' main motives behind this plan? Why did the Soviet Union react so strongly? Is the "Star Wars" plan truly as "omnipotent" as advertized? What is the possibility of this plan actually being realized?

The implementation of the "Star Wars" plan is divided into two phases. The first phase, which extends from FY 1984 to FY 1989, is concerned with feasibility studies and verification; specifically, it covers the following five areas: search, acquisition and tracking technology, directed-energy weapons technology, kinetic-energy weapons technology, system analysis and battle management techniques, and defense system technology. The second phase is concerned with whether and how this anti-missile system will be developed in the 1990's.

Therefore, the basic design of the "Star Wars" plan--a new anti-missile system--is far from being finalized. The many introductory articles which discuss the so-called multi-stage, multi-approach, space-based anti-missile systems only deal with the basic principles and general approaches of the current concept.

According to this concept, the intercept of an attacking missile can be divided into four stages:

First stage: boost phase intercept, which is the stage immediately after launch; it lasts approximately 3-5 minutes, during which time the missile continues to climb upward. During this period, the missile emits large amount of infrared radiation, which can be easily detected by early-warning

satellites; the intercept weapons used are X-ray laser weapons (anti-missile satellites). Theoretically, each satellite can destroy more than 100 ascending missiles.

Second stage: post-boost intercept. During this stage, the rocket is shut off, and the warhead (including the bus and the individual warheads) and penetration aids begin to separate from the missile and fly toward the target. At this time the missile is still emitting easily-detected infrared rays. During this stage, which lasts approximately 500 seconds, laser weapons or kinetic-energy weapons can be used to destroy the already-deployed warheads and the bus which may still contain undeployed warheads.

Third stage: mid-course intercept. The mid-course is defined as a 20-minute period between deployment of warheads and penetration aids and re-entering of the warheads back to the atmosphere. Intercept is difficult during this stage because of the large number of warheads and decoys. Generally, electromagnetic guns and non-nuclear intercept missiles are used to perform the intercepts.

Fourth stage: final stage intercept. After the warheads re-enter the atmosphere, intercept can be accomplished using anti-missile missiles, kinetic-energy weapons, and particle-beam weapons.

It is alleged that the probability of intercept for each stage is 90 percent; thus the overall probability of intercept of such a multi-stage, multi-approach defense system can be as high as 99.99 percent.

Struggle for Military Dominance in Space

Why did the United States announce its intention to develop the "Star Wars" plan? And why did the Soviet Union react so strongly to oppose the plan? The answer, very simply, is the fight for military dominance in space. At present, the Soviet Union and U.S. strategic nuclear forces consist of the "triad"--ICBM's and IRBM's, SLBM's, and strategic bombers; both sides are also striving to include strategic cruise missiles as part of their strategic forces. In the foreseeable future, which may extend beyond the end of this century, this balance of power is not likely to change. Therefore, both sides realize that the potential of continuing to develop strategic forces on earth is very limited; the struggle for strategic advantage must be shifted to space.

Before the United States announced its "Star Wars" plan, the struggles for space were carried out largely in secret, with no publicity. In most people's mind, the United States seemed to be always ahead in this struggle. Actually, this was a misconception. In fact, the military struggle in space between the two superpowers has also been a toss-up. It has even been predicted that if the United States does not take additional measures, and the current trend is allowed to continue, superiority in space may quickly shift toward the Soviet Union. Today, the Soviet Union clearly has advantages in the following areas:

1. Manned Space Flight

On 12 April 1961, the Soviet Union launched the first manned spacecraft, thus lifting the curtain for manned spaceflight technology. On 8 February 1984, three Soviet astronauts set a new record of orbiting continuously in space for 237 days. According to a U.S. Department of Defense estimate, by 1990 the Soviet Union will have a large, permanent space station capable of attacking any targets on the ground, on the ocean or in the air. Manned spacecraft has great military value; it is not only more effective than unmanned spacecraft, but can also selectively carry out reconnaissance and monitoring missions on ground targets, and provide command and control functions for ground forces. By establishing a transportation link between the space station and earth, it is possible to assemble a large military facility in space for the purpose of deploying intercept missiles, satellite defensive weapons, and offensive weapons which can attack targets on the ground or in space. On the other hand, only in a statement given by President Reagan on 25 January 1984 that the United States announced its intention to develop a permanent manned station in space within 10 years. Clearly, even if this goal is realized, they will still be behind the Soviet Union.

2. Anti-Satellite Weapons

Since the early 60's, the Soviet Union has been engaged in the development of anti-satellite weapons. It has gone through the early phase of technology development, the flight test phase, the improvement phase, and since 1979, it has entered the phase of actual war exercise. The Soviet anti-satellite satellites require very short launch-preparation time (less than 1 hour), and can perform intercepts at high altitudes (2000 km) and with high speeds (can approach and intercept targets within one orbit); but more importantly, the anti-satellite tests are sometimes coordinated with military exercises on the ground, indicating that the Soviet anti-satellite satellites have already reached a stage where they can be deployed in actual warfare. It represents a new military force in addition to the Army, the Navy, the Air Force, and the strategic Rocket Forces. In the United States, two non-nuclear anti-satellite missile tests were conducted in the western test ranges using F-15 aircraft on 22 January and 13 November 1984. It is estimated that they will be ready for deployment in 1987, apparently behind the Soviet Union. In fact, the United States is very concerned about the disparity in anti-satellite weapons between the two countries.

3. Deployed Anti-Missile Systems

Since 1964, the Soviet Union has been deploying the "rubber Galoshes" anti-missile system around Moscow, which includes four missile sites and 64 missile launchers; the capability of this sytem has been under continuous improvement over the years. This is the only deployed anti-missile system that exists in the world today. The United States on the other hand, does not have a deployed anti-missile system. In August 1984, the U.S. discovered that 68 silos had been built around Moscow which could accommodate the newly developed SH-04 and SH-08 anti-missiles. In September, the U.S. also discovered the construction of a large phased-array radar near Moscow for commanding the anti-missile system.

Of course, in some areas the United States has made significant breakthroughs and is ahead of the Soviet Union. For example, on 10 June 1984, 185 km above Kwajelein Island in the Pacific, an infrared-guided non-nuclear intercept missile destroyed by direct collision a Minuteman-I simulated ICBM warhead which was launched 30 minutes earlier from Vandenburg Air Force Base; this was the first direct intercept of an ICBM by an anti-missile missile. In October 1984, the United States successfully tested an X-ray laser in the laboratory, which was a major breakthrough in X-ray laser research. On 21 June 1985, an argon laser experiment was successfully performed on the Space Shuttle "Discoverer". The success of this experiment verified the capability of a laser to track a high-speed object (the Space Shuttle was in a 354-km orbit and moving at a speed of 8 km/sec), and for the first time demonstrated the feasibility of using a space-based laser/mirror design in an anti-missile system. On 13 September 1985, the United States used a small anti-satellite missile to destroy an old scientific satellite in orbit by direct collision; this was the first successful intercept of a satellite using kinetic-energy weapons.

Now, the United States has changed its previous position and openly announced the "Star Wars" plan. Aside from political and psychological reasons and trying to pressure Congress to allocate funds for defense, the basic motive is to take advantage of its superiority in some areas and concentrate its human and material resources to achieve military dominance in space. Its main objective is to cause the Soviet Union to suffer economic collapse, to surpass the Soviet Union in technology, and to overwhelm the Soviet Union in military development. Of course, this cannot be tolerated by the Soviet Union.

Future Prospects

The "Star Wars" plan is by no means an accident; it is the inevitable culmination of development and competition in missile technologies and anti-missile technologies between the two superpowers. Its announcement and the subsequent new round of competition in space will result in qualitative changes in the arms race between the two superpowers. The primary changes are: (1) the goals of anti-missile weapons have shifted from point defense (or regional defense) to nationals defense or even multi-national defense; (2) the defense strategy has shifted from a simple, isolated system to a complex, multi-stage system; (3) the struggle for space has shifted from the near-earth region to outer space; (4) the simple offensive and defensive systems have changed to a space-based system using directed-energy weapons for both offense and defense; (5) the weapon systems have changed from expendable weapons with large kill power to a new generation of reusable strategic weapons which are designed primarily for destroying large numbers of enemy targets in a very short time with little or no power for killing human lives. These changes will necessarily lead to new developments in strategic concept and in new theories and tactics for conducting warfare.

One may ask if the seemingly omnipotent "Star Wars" plan conceived by its designers can actually be realized? Although it is still too early to answer this question, some preliminary observations can be made based on the history of Soviet and U.S. strategic weapons development after the war and based on the current levels of technology.

First, the United States does not have a patent on "Star Wars." On 28 January 1985, the Soviet physicist Nikolayi Basov, director of the largest Soviet institute in laser and fusion research and a Nobel prize winner, stated that there is no basic technical difficulty for the Soviet Union to catch up with the United States' "Star Wars" plan. He stressed: "There is no scientific difficulty in developing a laser intercept system in space." This indicated that both the United States and the Soviet Union have the technologies to develop such a system. Furthermore, the current levels of technology on both sides are very close.

Second, the "Star Wars" plan has many weak points. Not only many technical difficulties must still be resolved, the cost is huge (24.7 billion dollars is planned for feasibility studies through FY 1989, and the total investment will be several hundred billion or even 1 trillion dollars), and there are many opponents both at home and abroad (Australia and France refused to take part in this plan), but more importantly, since the system assumes a probability of intercept of close to 100 percent in order to destroy all the incoming missiles, hundreds of sensors and weapons must be deployed in space. At the present time, both the United States and the Soviet Union have a full account of the other side's space vehicles; hence it is technically not difficult to destroy, or at least to deactivate the sensors so that the "Star Wars" plan will be paralyzed. A working group consisting of Soviet anti-nuclear scientists has concluded from their investigations that the "Star Wars" system can be made totally ineffective by weapons which would cost only 1-2 percent the amount of developing the "Star Wars" system. Specifically, by deploying "space bombs" in the vicinity of the "Star Wars" space station, it is possible to destroy the system before it has an opportunity to initiate defensive attacks. Clearly, it is not difficult to detonate either nuclear or non-nuclear devices deployed in space; and there is no warning time.

Third, the Soviet Union is not likely to stand still. On 4 May 1985, the Soviet Defense Minister Sokolov warned: "If the United States destroys the strategic balance of power by militarizing space, the Soviet Union has no choice but to take counter measures in order to restore balance." Reportedly the Soviet Union may deploy bombs in orbit next to the U.S. satellites. Such devices will be orbiting the earth and remain totally harmless, but upon receiving command from the ground, they will detonate and destroy themselves as well as the target.

In summary, the probability of realizing a system which can destroy nearly 100 percent of the attacking warheads and space vehicles as suggested by the "Star Wars" designers is very small; however, the probability of partial realization is quite large. In the future, both sides will continue to struggle for dominance in space, and will continue to deploy new weapon systems including kinetic-energy, laser, particle-beam or even nuclear weapons. The new arms race in space will not cause strategic nuclear weapons to disappear on earth; it will only provide a new territory for nuclear strategic competition on a larger, newer scale. In the foreseeable future, the strategic balance between the two countries including space is not likely to be broken.

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CSO: 4008/47

NATIONAL DEVELOPMENTS

VICE MINISTER REVIEWS ELECTRONICS INDUSTRY

OW041221 Beijing Domestic Service in Mandarin 0630 GMT 2 Mar 86

[Recorded talk by Zhang Zuedong, Vice Minister of the Electronics Industry, entitled "China's Vigorously Developing Electronics Industry"]

[Excerpts] Comrades, the electronics industry is a newly-emerging one, to which the people all over China have shown a great deal of interest. Today, I would like to brief the large numbers of listeners across the country on the rapid progress achieved by the electronics industry during the Sixth 5-Year Plan, its fighting goals and guiding ideology for the Seventh 5-Year Plan, and the major tasks for 1986.

1. Rapid Progress Scored During the Sixth 5-Year Plan

Earnestly implementing the party's line, principles, and policies, leading cadres at all levels and the vast numbers of staff and workers in the electronics industry departments worked hard and concertedly in line with the ministry party group's fighting goals and general requirements, which called for laying sound foundations, raising the level, improving the quality, stressing efficiency, octupling [fan san fan] the output value, and prefulfilling the goal by 10 years [chao shi nian], in a reformative and enterprising spirit during the Sixth 5-Year Plan, thereby fulfilling the targets of total industrial output value and profits set in the Sixth 5-Year Plan by two years, opening up a new situation in the electronics industry characterized by sustained, steady, balanced, and vigorous development, and bringing about a breakthrough, as well as penetrating changes, in many fields.

The output and efficiency increased simultaneously. All major economic indexes reached an all-time high. In 1985, the industry's total output value was 28.6 billion yuan, doubling the figure set in the Sixth 5-Year Plan, an increase of about 180 percent over 1980. The annual growth rate during the five years averaged 23.3 percent. (?Taxes) delivered in 1985 totalled 4 billion yuan, up 186 percent from 1980. Annual labor productivity was 19,318 yuan per person, more than double that of 1980, and the profit and tax rate of investment was 25.5 percent. Achievements were also made in both technological transformation of old enterprises and construction of key projects, which have reinforced our material and technical foundations. One third of the key enterprises carried out technological transformation of various kinds. A total of 22 large and medium-sized key projects, including

color kinescopes, advanced integrated circuits, computers, and major machinery parts and components, were successively completed and put into operation.

In order to meet the growing market demand, the output of consumer electronics goods increased by big margins during the Sixth 5-Year Plan. Over 40 million TV sets were manufactured during the five years, topping the Fifth 5-Year Plan more than sevenfold. Of this figure, color TV sets totalled 5.7 million. The industry turned out a total of 25 million cassette tape recorders, twenty two fold over increase, and more than 100 million radios, up 45 percent from the Fifth 5-Year Plan.

In short, fairly large progress was achieved in various fields of the electronics industry during the Sixth 5-Year Plan, which has not only contributed to promoting the modernization drive, raising economic efficiency and social benefit, prospering the market, and enriching the people's material and cultural life, but has created sound foundations and conditions for carrying out the Seventh 5-Year Plan.

2. The Fighting Goals and Guiding Ideology During the Seventh 5-Year Plan

The general objective for developing the electronics industry during the Seventh 5-Year Plan is to carry out extensive cooperation and services in the light of the needs of the whole industry, the four modernizations drive, and the new technological revolution, and to concentrate all forces on making strategic changes in the following two fields: Changing the focus of the industry to serve the needs of the national economy, the modernization drive, and the whole social life, and changing the direction of development to making micro-electronic technology the foundation of, and computers and communications the major fields in, the industry.

3. The Jamor Tasks for 1986

As 1986 is the first year of the Seventh 5-Year Plan, this year's work is of great importance in the development of the Seventh 5-Year Plan and the overall reform situation. It is necessary to strive to win the first campaign.

The electronics industry faces broad prospects as well as a heavy task. We are convinced that, under the leadership of the party Central Committee and the State Council, and through joint efforts by all staff and workers in the industry, we shall definitely be able to create a new situation in bringing about a vigorous growth in China's electronics industry and make our contribution to realizing the general task and objective set by the 12th CPC National Congress.

This is the end of my talk. Thank you very much.

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CSO: 4008/1046

SCIENCE, TECHNOLOGY ASSOCIATION OUTLINES PLAN

OW180043 Beijing XINHUA Domestic Service in Chinese 1130 GMT 17 Feb 86

[By reporter Zhang Jimin]

[Excerpts] Beijing, 17 Feb (XINHUA)--The China Association for Science and Technology held a meeting of its standing committee today, and decided that, in carrying out this year's work, the association would focus on the strategic points for developing science and technology included in the state's Seventh 5-Year Plan, and effectively organize and mobilize the large numbers of scientific and technical personnel in making new contributions to China's scientific and technological progress and economic and social development.

Following are the focal points for this year's work:

1. Actively promote reform among the societies affiliated to the association, in order to build up their capabilities to serve economic development. Societies at all levels should base themselves on the practical needs of the national and local economic development in organizing comprehensive academic activities in a planned manner. It is necessary to support and encourage the societies to promote appraisal and commendation of outstanding theses in order to stimulate scientific and technological progress. The association has decided to set up an annual meeting system, beginning in 1987, and hold a large comprehensive meeting to discuss major topics of economic and social development annually.

2. Conduct in-depth work to popularize science and technology, focusing on invigorating the local economy. Associations for science and technology in all localities should strive to promote the study and development of crop cultivation, aquiculture, and applied technologies for village and township enterprises.

3. Strive to train scientific and technical reserve forces with ideals and innovative spirit. While unfolding various extracurricular scientific and technological activities for youngsters this year, special attention should be given to the third national children's invention contest, scheduled for this summer.

4. Step up people-to-people scientific and technological exchanges with foreign countries to stimulate science and technology and prosper China's economy. Special emphases should be given to academic exchanges in new scientific subjects or alternate subjects [jiao cha xue ke 0074 0643 1331 4430] conducive to the economic and technological development of China and to international academic meetings to be sponsored by our country.

5. Make adequate preparations for the association's third national congress to be convened this year.

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CSO: 4008/2072

NATIONAL DEVELOPMENTS

GOALS STATED FOR FUTURE BEIJING S&T DEVELOPMENT

Beijing BEIJING KEJIBAO in Chinese 22 Jan 86 p 1

[Report by Chen Zhiqiang [7115 1807 1730]: "The Primary Scientific and Technical Mission of This City in the `Seventh 5-Year Plan'"]

[Text] During the "Seventh 5-Year Plan," at the same time that this city carries out a penetrating restructuring of its science and technology system, it will adopt various ways to vigorously develop the advantages of science and technology in the capital and will provide more scientific and technical achievements that are of a higher standard and that generate better results, all to better raise the scientific and technical level of this city. Recently, at the first summing-up meeting for specialist advising convened by the municipal government, Comrade Lu Yudeng [7120 1342 3397], chairman of the municipal committee standing committee and of the municipal science and technology commission, said all this when he was speaking of the primary scientific and technical mission of this city during the "Seventh 5-Year Plan."

He said that during the "Sixth 5-Year Plan" this city made startling developments in the aspects of science and technology. We obtained 1,765 scientific and technical achievements in all from 1981 through 1984, which was about 2.3 times the number obtained during the "Fifth 5-Year Plan," and 1,390 among them were awarded national or municipal achievement prizes. In 1985, the science and technology front in this city flourished even more, there having been more than 6,300 science research projects arranged in scientific and technical planning at all levels throughout the city. From these there were 2,400 achievements, the majority of which have already served the economic construction and social development of the capital.

Comrade Lu Yudeng pointed out that during the "Seventh 5-Year Plan," we will mobilize scientists and technicians throughout the city to go further in firming up the thinking that "science and technology must cater to economic construction"; we will continue to adopt methods that are a continuous process from research to development to demonstration to dissemination, and in the aspects of microcomputer technology, biological technology, new materials technology, water conservation technology and water resources, energy conservation technology and new energy, urban modernized management, medical treatment and hygiene, vegetable and fruit products, and new products,

strains, and breeding for livestock, fowl, and aquatic products, we will develop a number of scientific and technical achievements that have practical value, and that can also constitute production capabilities; at the same time as we import advanced technology from both abroad and internally, we will quicken its assimilation, absorption, and nationalization; we will selectively enhance construction in rising new technologies and rising new industrial bases to make technical preparations for the next 10 years of great development; we will also pay close attention to a number of technologies that can close gaps and make complete systems, technologies that require little investment, short durations, and that have obvious economic results. This will serve to vigorously promote small and medium enterprises and to develop town and township enterprises.

12586
CSO: 4008/2067

NATIONAL DEVELOPMENTS

MAJOR S&T PROJECTS PRODUCE FAVORABLE ECONOMIC RESULTS

Beijing GUANGMING RIBAO in Chinese 19 Jan 86 p 1

[Text] Reporters have learned from the national economic working conference currently in session that 40 major projects included in the "Sixth 5-year Plan" under the responsibility of economic commissions for the dissemination of new technologies have been basically completed. Among them, projects like replacing silver with aluminum in making mirrors, fuel savings for the Jiefang Model B vehicle, and hot processing have been fundamentally spread throughout the country; projects like technology used at oil field stations, fire resistant synthetic fibers, kayaohua [Catalan ?] forge, metallic spray painting, and electric brush plating have been extended to from 70 to 80 percent of the country. Dissemination of these projects has meant clear gains in economic results. According to incomplete statistics from 16 projects, from a national investment of 142 million yuan, during the "6th Five Year Plan" 1.089 billion yuan was either created or its use value was recovered, and there were savings as well of 5 million tons of coal, 480 million kwh of electricity, fuel consumption of 20,000 tons, 91.8 tons of silver, and 60 kg of gold.

According to materials provided by the science and technology office of the National Economic Commission concerning the national economic working conference, for the 40 major new technology projects mentioned above that have been disseminated, 17 projects have had economic results during the "Sixth 5-year Plan" of more than 100 million yuan, 7 have had more than 500 million yuan, as for example where electric brush plating is already in use on 3,000 pieces of power equipment, created or recovered use value is above 700 million yuan, and there have been savings in foreign exchange of more than 55 million U.S. dollars. Hot spray painting technology is in widespread use at more than 600 units throughout the country, which has either created or recovered use value of 1.3 billion yuan. Due to the fact that the new technology in which aluminum replaces silver for mirrors has been fundamentally disseminated throughout all professions, production quantities of aluminum mirrors have reached 1 million square meters, which has saved 60 tons of silver. Aside from this, projects like breeding and cultivating improved varieties of crops, highly efficient and energy conservative electric lighting, a new model combustion fuel and gas nozzle, and low melting point alloy molds have also had rather large economic results.

During the "Seventh 5-year Plan," the goals for science and technology work in the economic commissions will be to improve the economic results for enterprises and to enhance capacities for export and for creating foreign exchange. Focus will be on dissemination of science and technology achievements in five areas: promoting development of agriculture, forestry, animal husbandry, by-products, and fishing, as well as relevant technologies; developing key technologies for energy, transportation, posts and telecommunications, and raw materials; rising new technologies that center on microprocessor utilization; new technologies that raise the capacities of machine and electronic products to be exported and to create foreign exchange; and advanced technologies that will have a great effect on improving and enriching the standards of the material and cultural life of the people.

12586
CSO: 4008/2058

NATIONAL DEVELOPMENTS

RECENT SUCCESSES FOR S&T INTEGRATION WITH PRODUCTION

Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 14 Feb 86 p 1

[Report by Chen Zujia [7115 4371 3946]: "Integration of Science Research with Production is Unprecedentedly Dynamic"]

[Text] In 1985, China's restructuring of its science and technology system gradually unfolded, taking decisive steps forward. Practice has shown that the direction of the restructuring of the science and technology system is correct, that progress has been healthy, and that scientific and technical work has begun to appear unprecedentedly dynamic as it caters to economic construction.

The other day responsible persons in the State Science and Technology System told reporters that the goal of this restructuring was to release production forces and promote the economy. Accelerating the integration of science and technology with the economy has also become a central problem for the science and technology reform. During this year, the nation will focus on this problem and will adopt a series of measures in the areas of restructuring management methods for allocating science and technology funding, opening up technology markets, promoting the integration of science research with production, strengthening the technical absorption and capacities for development of enterprises, and restructuring the specialist and technical cadre management system, and initial results have already been had. In the face of actual practice, some comrades who had formerly not realized the importance of this integration of science research with production have come to change their views, and awareness within scientific and technical circles has become unified. This has been the best outcome from the year of reform of the science and technology system.

These persons of responsibility spoke of the changes the restructuring had brought to science and technology.

The science and technology markets have sprung up vigorously. That technical achievements are products has become universally understood. Technical products are flooding the technology markets from the coast to the border areas, from the cities to the villages. Even though development of the markets was affected by factors such as money being tight last year, there were difficulties getting loans, and some technical achievements could not be

adapted to the marketplace, by the end of 1985 however, the volume of deals implemented at national technology markets had reached 1.77 billion yuan. Technical achievements passed through circulation to enter production, generating economic and social results that are hard to estimate. For certain enterprises, and especially small and medium enterprises and town and township enterprises, it was like a nourishing rain on grain fields, there was an infusion of vitality, and the crop matured to be strong.

A large number of important scientific and technical achievements were awarded prizes. Last year there were 10,476 important scientific and technical achievements awarded prizes after evaluation by the provinces, autonomous regions, directly administered municipalities, and various ministries of the State Council, while in the first 4 years of the "Sixth 5-Year Plan" the annual average number of scientific and technical achievements awarded prizes within the scope just mentioned was only 5,631. In addition, there were in all 185 scientific and technical achievements awarded national prizes of invention last year by the State Science and Technology Commission, as well as 1,772 national science and technology advancement prizes the first time that this has been authorized. The total direct results from these projects are approximately 33.4 billion yuan.

Research, education, production, and joint organizations of various forms have come into being, and are just unfolding. Just on the basis of last year's statistics, there were nearly 10,000 joint organizations of various sorts throughout the country. There have been new trends especially from the point of view of the formats and content of these joinings: they have developed from single project technical cooperation to the development of entire sets of technology; they have developed from limited, loose integration to long term, fixed integration; they have developed from single disciplines and specialties to the inter-regional and interdisciplinary.

Movement of scientific and technical talent has become reasonable. According to a statistical sampling at the end of last year by the State Science and Technology Commission, in 1985 more than 3,000 specialists moved from major cities, more than 1,600 moved from small and medium cities, and more than 1,200 moved into county and town and township enterprises. Although the numbers are rather small, this shows that movement of talent is gradually becoming reasonable. When scientists and technicians move into units and regions that lack talent, this promotes intellectual exchange and the integration of science and technology with the economy.

12586
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NATIONAL DEVELOPMENTS

CHINA ACHIEVES SUCCESS IN WORLD S&T MARKETS

Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 15 Dec 85 p 4

[Text] Reporters have learned from the National Science Commission that a certain amount of advanced technology embodying the wisdom of Chinese scientists and technicians has become commercial products that have entered the international marketplace.

Not long ago, at the second Barclay Technology Market Exhibition held in Birmingham, England, the 29 technical achievements taken there by the Chinese delegation made up of units from the National Science Commission elicited great interest on the part of specialists and agents from many countries. In only 4 days, agreements and letters of intent were signed for 13 projects. Among them, the United States, England, and West Germany signed contractual agreements for technical rights to a "new method for producing citric acid" researched successfully by the Huadong Chemical Engineering Academy. Among agreements signed with England, there will be annual net profits to our side of more than 500,000 English pounds. The Barclay Bank has indicated that they are willing to provide loans for any Chinese deal, and many intermediary organizations have expressed to us a willingness to act as our representatives for technology trade outside China. The United States, France, and England have also invited us to participate in their technology trade fairs next year.

Relevant personnel in the National Science Commission said to reporters that at the same as we further improve and develop our domestic technology markets, the National Science Commission will consider the arranging of technology exports to be a major task from now on. Next year, in addition to participation in the invention exhibitions in Geneva, Switzerland and in Canada, we tentatively plan to participate in technology trade activities held by Japan, the United States, and England in March, May and November, respectively.

12586
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NATIONAL DEVELOPMENTS

RESULTS OF MAJOR PROJECTS HAVE POSITIVE IMPACT ON PRODUCTION

Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 1 Jan 86 p 3

[Text] During the period of the "Sixth 5-year Plan," 20 major basic research projects arranged by the State Economic Commission scored great successes: some basic theoretical research has already reached a nationally advanced level; after a number of basic research achievements were used in production efforts, they brought in remarkable economic results.

To allow science research to reach disposition in depth, as well as to allow basic research to develop in a stable, continuing way, during the period of the "Sixth 5-year Plan," the State Economic Commission focussed on 20 basic and applied basic research projects in mathematics, physics, chemistry, mechanics, biology, chemical engineering, engineering thermodynamics, and materials science. They also broke through divisive limitations and selected special units throughout the country, organizing them into carrying on joint research without regard to departments. There were altogether more than 90 units from 20 departments that took up the research duties for these projects. The majority of this group of research projects proceeded from the characteristics of disciplines, and were proposed in consideration of problems in our economic construction that needed solving in aspects of energy, natural resources, materials, environmental protection, biological technology, and precision engineering. During the work process, not only did they not relax the exploration of questions of fundamental theory, but also were careful to use scholastic achievements promptly in production. In aerodynamic research at Huazhong Engineering Academy involving the combustion process, through experiments with water simulation, aerodynamic simulation, and hot-start simulation, they developed for the first time in China a new technology for an odd-shaped particles stablizing combustor, which allows the powdered coal boilers of generating plants to reliably burn inferior coal, as well as to be able to save on combustion fuel. The results from its test use by only 44 boilers in 29 generating plants are annual savings in expenses of more than 50 million yuan. According to incomplete statistics, after results from these 20 major basic research projects were used in actual production, economic results so gained have been more than 200 million yuan, which is several times more than the economic investment in these projects. The economic results that can be obtained from seven projects among them, Xi`an College of Communications' "Researches Into Pipeline System Vibration," are above 10 million yuan.

The State Economic Commission has made the necessary arrangements in these 20 major research projects for those that cannot directly show economic results but are basic research of a higher caliber and of a high scholastic level.

As work develops in these major basic research projects, relevant departments and units will have correspondingly built and enriched a number of laboratories, making them into a base for basic research that is special to this country, where basic science research contingents will have obtained stability and development and will have fostered and trained a number of scientists and technicians of a high level, and where much outstanding talent will have emerged.

12586
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NATIONAL DEVELOPMENTS

NUMERICALLY CONTROLLED MILLER SUCCESSFULLY MANUFACTURED

Beijing JINGJI RIBAO in Chinese 29 Jan 86 p 2

[Article by Qing You [7230 2589]: "Numerically controlled Millers up to the Standards of the 1980's Successfully Manufactured in China"]

[Text] Two types of advanced numerically controlled machine tools to be used in the design and manufacture of aircraft parts, namely, the three-coordinate numerically controlled miller and the five-coordinate numerically controlled miller, were successfully manufactured by the aeronautic technological research institute of the Ministry of Astronautics not long ago.

With the aid of electronic computers in design, these numerically controlled millers, which are up to the standards of the 1980's, can help shorten the trial manufacture period of airplanes with very remarkable economic results. As we understand, when the five-coordinate numerically controlled miller manufactured by this institute was used to process a new type of aircraft part of the Shenyang Aircraft Plant, the trial manufacture period was reduced by 6 months with a saving of 122 steps and 2 million yuan. The machine tools of this kind, formerly produced in small quantities, were only up to the international standards of the 1960's in terms of technology and performance. They were inadequate for our requirements, and only a few countries in the world could produce them. To reduce the gap between the Chinese and the international standards in the technology of designing and manufacturing aircraft, the problem of modernizing the production equipment was in urgent need of solution. On the basis of full investigation and appraisal, this research institute studied the similar equipment of other countries, and then supplied reliable data for the trial manufacture of prototype airplanes.

On the question of importing advanced equipment from abroad, this institute was of the opinion that the basic way to reduce the gap was to raise our own standards, since sole reliance on the purchase of equipment would still fail to accomplish this purpose. The main goal of importing technology should be to strengthen our self reliance. Therefore, the institute made full use its technical resources in the comprehensive and in-depth analysis and assimilation of the advanced foreign technology from the time when it first assembled the parts imported as bulk cargoes, and then replaced them with more and more domestically produced components and raw materials. Through the efforts in various quarters, it was able to begin the manufacture of its own

prototype airplane and the small-scale production of components and raw materials in only 4 years. At present, 30 out of the 48 parts in the machine tool are produced in China. A total of 139 types of materials and 150 sets of components, 70 percent of the grand total of materials and components, are now being used. The numerically controlled machine tools made of domestically-produced components and raw materials are up to the standards of similar numerically controlled machine tools of foreign countries, and the computer technology has reached the standards of the early 1980's. This not only marks a new development of China's technology in the manufacture of machine tools, but also reduces the time-lag between China and the foreign countries in the technology of manufacturing advanced products by more than 10 years. Because of its mastery of advanced technologies, this institute has also trial manufactured a four-coordinate numerically controlled miller urgently needed for the production of helicopter parts.

This institute has now received orders from the major aeronautic plants for 16 sets of equipment to be used entirely for research in manufacturing new airplanes. If all these sets are purchased from foreign countries, we will not only fail to learn any new technology or to improve the technology of producing machine tools, but also have to spend more than $10 million. Now that China is able to manufacture these machine tools, its expenditures in technical transformation alone will be reduced by 12 million. The value would be even greater if the economic results in production are also taken into account. The successful manufacture of this machine tool will not only meet the requirements of China's aeronautical industry for the next 10 years, but also set a good example for the proper handling of imports.

9411
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CONFERENCE ON COMBINING RESEARCH, PRODUCTION HELD IN DALIAN

Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 17 Dec 85 p 4

[Article by Ruan Bingsen [7086 4426 2773] and Chen Zujia [7115 4371 3946]: "Fang Yi Stresses Strengthening of Joint Groups for Science Research and Production"]

[Text] Member of the CPC Central Committee Political Bureau Fang Yi pointed out on 16 December that we must further develop and enhance the integration of science research and production in all forms. Fang Yi said that the party Central Committee and State Council had evaluated highly the development of joint forms of science research and production. When he was evaluating the significance and functions of these kinds of integration he felt that having many types of integrated research and production is an important form of organization for strengthening the integration of science and technology with the economy, and is an effective blow against divisions between areas and problems with departments. He also felt that it is an effective path toward strengthening the capacities of large enterprises for technology exploitation and absorption.

Fang Yi said this as the National Conference for the Exchange of Experiences Regarding the Joining of Research and Production was concluding. In his speech he analyzed the current situation regarding restructuring of the science and technology system. He said that reform of the science and technology system has already become one of the important matters in China's restructuring, and had become a major item in the eyes of the whole party and of the people of the nation. The nation has determined that during the "Seventh 5-Year Plan" it will correspondingly increase science and technology funds. The technology markets have developed greatly. Various forms of joint arrangements of research, education, and production are in the ascendant. The scientists and technicians technical vocation hiring system is spreading everywhere. The National Natural Science Fund Commission is just now deliberating. Science and technology legislation and science and technology statistical work is just now intensifying. Progress in the establishment of science and technology credit and risk investment has had a good beginning. To allow for stable forward progress in reform of the science and technology system requires that we strive over a long period.

As Fang Yi was talking of the major tasking during the "seventh 5-year plan," he stressed that restructuring the science and technology system was not only an affair of the science and technology departments but is also a matter for departments concerned with planning, economics, finance, taxation, education, labor, and legislation. All relevant departments in the nation must be diligent in making their own contributions to promoting the restructuring of the science and technology system.

The National Conference for the Exchange of Experiences Regarding the Joining of Research and Production held in Dalian concluded on 16 December. Song Lian, deputy director of the State Council science and technology leading group, handled the closing ceremonies and also spoke.

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NATIONAL DEVELOPMENTS

EFFECTS OF RISING NUMBER OF INTEGRATED OPERATIONS NOTED

Shijiazhuang HEBEI RIBAO in Chinese 21 Dec 85 p 1

[Text] As the restructuring of the science and technology system has unfolded, research and production integrated bodies in this province have grown to more than 1,000. Many integrated bodies are just developing from initial levels to higher ones, from short term to long term, and from loose models to tight ones. These science and production integrated bodies are a new form of technical and economic organization, the important functions of which are more and more evident.

First of all, by promoting the integration of research and production, the time for research achievements to be transformed into production forces is shortened, which is of benefit in unifying research and production. The Tianjin Institute of Electrical Transfer Design of the Ministry of Machinery Industry completed the design of a hot metal detection device in 1982, but restricted by conditions, they had to wait until this year for trial production. After this institute had made a deal with the Baoding Automation Equipment Plant to form a research and production integrated body, they had produced the product in less than 6 months, and it passed technical appraisal.

Second, it is beneficial to developing products of outstanding quality and strengthening the capacities for competition among enterprises. The Instrument Plant in Botou developed jointly with the Shanghai Institute of Automated Instruments a steam flow meter, which was awarded the "Gold Dragon Award" for new products by the State Science and Technology Commission, and which has twice been cited by the State Science and Technology Commission and the Ministry of Machinery Industry as a new product to be disseminated throughout the country.

Third, it is beneficial to the advancement of technology and to the training of talent. Integrated bodies are organic combinations that have different levels and research personnel, engineers, and technicians of different types, which serves to get the most from each in pushing technical advancement. At the same time, the adoption of new technology also promotes study by factory management personnel and technicians and workers, and it improves enterprise management standards and its technical quality. Many enterprises have used

the opportunities from having scientists and technicians from colleges and universities and from research units working in their factories to run training classes or technical schools, which has had good results.

Fourth, each aspect of an integrated body can achieve a certain measure of economic results. After the Baxian General Machinery Plant joined with the No 17 and No 207 Research Institutes of the Ministry of Astronautics, they developed large children's play equipment, like traveling missiles and aircraft, which in a relatively short time have had obvious economic results.

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NATIONAL DEVELOPMENTS

PRINCIPLES FOR IMPORTATION, USE OF TECHNOLOGY SUGGESTED

Beijing GUOJI MAOYI WENTI [INTERNATIONAL TRADE JOURNAL] in Chinese
No 6, 1985 pp 5-10

[Article by Yi Hui [1707 6540], Office of Policy Research, Ministry of Machinery Industries: "Some Thoughts on Suitably Advanced Technology--Important Guiding Ideology for the Importation of Foreign Technology"]

[Text] Use of Advanced Technology is a Scientific Concept

At the same time that we import foreign technology we must oppose two prejudices: one is to ignore our national conditions and one-sidedly seek after the advanced; the other is to ignore the advanced by one-sidedly focusing on the existing base. These two prejudices that actually exist in the work of importing foreign technology are both created through errors in guiding ideology, and if we do not guard against them and pay attention, they will grow into strategic errors.

The prejudice by which people one-sidedly seek after that which is advanced comes from an ignorance of this country's actual situation. People who do this have not correctly recognized the economic and technical situation in this country and its requirements, nor our capacities for absorption and assimilation. This kind of advancement is a blind, abstract advancement where haste makes waste, and which must necessarily lead to the wasting of funds; the prejudice by which people one-sidedly focus on the existing base comes from an evaluation of this country's economic and technical base and capacities that is too low. They cannot see their own advantages, nor the creativity and motivation of people in this country. This naturally leads to following on the heels of foreign countries, blindly following their lead, with never any way to allow China's science and technology and the national economy to leap into the ranks of advanced world levels. Because of this, to analyze correctly and treat our actual national situation in a practical manner is extremely important for establishing a correct guiding ideology for the importation of technology.

The current situation regarding the material technical base in this country is, simply put, that it has been under construction for 35 years, and a material technical base of reasonable scale has already been established, and this constitutes a strong ability for building toward a socialist

modernization; but this material technical base and building capacity is still some distance behind advanced countries in the world and from socialist modernizing construction. This situation is specifically apparent in the following aspects:

I. The science and technology system has already been formed, but the quality of science research is somewhat backward. China has formed a science and technology system that is complete in disciplines, where there are more than 430 independent science research organizations at the prefectural and city level throughout the country, with a contingent of 6.85 million scientists and technicians, and where each year there are thousands of research achievements registered with the state by regions and departments. But we must see that because of years of "leftist" ideological guidance, knowledge has been thought lightly of, and striking out against intellectuals became a social phenomenon, and the intelligence and wisdom of scientists and technicians were suppressed. Add to that a long term isolationist policy, and we can see the technical quality and knowledge structures of our scientists and technicians would always lag behind the development of modern science and technology, and could not suit the needs of modernizing construction. Scientific and technical facilities are also rather obsolete and backward, requiring renovation and improvement.

II. Certain high technology fields have leaped into prominence in the world, but the vast majority of technical fields are universally backward. In certain high technology fields, as for example space navigation technology, atomic energy technology, and electronics, China has already entered the world's advanced ranks. Since 1970, we have successfully launched 15 satellites. Among them, long range rockets flew into the Pacific, under the sea submarines have launched solid body carrier rockets, experimental communications satellites have been launched into geosynchronous orbit and successfully located, which shows that China's space technology has already joined the ranks of the world's advanced. The first 100 million operations super computer and the first 10 million operations vector computer successfully built by China indicate that we have attained advanced world status regarding the building of super computers. However, in general industrial technical fields like chemical engineering, metallurgy, and machinery, the scientific research levels, design levels, and technique levels are universally behind advanced world standards. Of the current 400,000 enterprises in this country, only 20 percent have technology and equipment that are advanced, with 30 percent having that of general quality, and about half the enterprises having processing equipment and measurement equipment that is obsolete and in urgent need of replacement.

III. Raw materials and technical equipment are basically sufficient for domestic use, but there are few types of products, quality is deficient, and technical performance is low. The steel products, non-ferrous metals, and materials for chemical engineering that are needed by China's national economy, as well as the technical equipment to equip the national economy, are already basically provided within the country. Taking the machinery industry as an example, the domestic machinery industry has provided 300,000 kw thermal and hydroelectric generating units, 330,000 volt and 500,000 volt output transformer equipment for the power departments; for the metallurgy industry

they have provided 30,000 ton drop-forged hydropresses, cold and hot rolling machines for 2400 aluminum slabs, and rolling machines for extra-thick 4200 slabs; for all professions and industries in the country they have provided 130 different kinds of high precision machine tools and more than 40 different numerically controlled machine tools; for agriculture and the national defense they have provided a large batch of technical equipment. According to statistics, of the technical equipment needed by all departments of the national economy, more than 85 percent is provided by the machinery industry. However, the variety, quality, and technical performance of domestic products are still far from satisfying the needs of modernizing construction. Surveys have shown that the varieties of Chinese electro-mechanical products are for the most part still at the world levels of the 1950's and 60's. Only a few approach or reach the levels of the 1970's. Some of the electro-mechanical products of modern standards needed by the national economy are still in short supply; much large and bulky energy consuming equipment is backward in performance, and energy consumption is high; we cannot yet produce many of the high precision, high efficiency machine tools and accurate instruments and meters.

IV. Industries along the coast and in the established industrial bases are somewhat developed, while the vast number of those in the interior are quite backward. Due to historical and geographical reasons, each province and municipality along our coast, as well as some established industrial bases, are also more developed in the areas of science and technology and production capacity. Thirty-five years of construction, and especially the three lines of construction in the early 1960's, have played a positive role in changing this inequality in economic and technical development. Looking from the current overall industrial picture, China has already formed an industrial situation where departments are rather complete, the overall arrangement is reasonable, the standards of installed equipment are steadily improving, and everything is at a fitting scale. Because industrial environments are rather backward in the interior, and especially regarding the industrial base, transportation and shipping, and science instruction in the three line regions, technology and the economy are still behind that of the coastal provinces and municipalities and the established industrial bases. As far as science research organizations and scientific and technical capacities are concerned, they are all quite behind that of the coast and established industrial areas. The majority of new products, new technologies, and new techniques are being developed successfully along the coasts and at established industrial bases.

Beginning from the preceding analysis of the national situation, we naturally come to the concept of suitably advanced technology. This concept not only stresses advancement, but also suitability. By bringing them organically together, we can prevent the two deviations of one-sided seeking out of the advanced and one-sided stressing of existing bases. By suitably advanced technology is meant: technology that has already been replaced in developed countries; technology that is currently being used in developed countries; and a certain portion of new technology that is just now appearing in developed countries. In this way, having technology of all levels in reasonable allocation according to actual need we can impel China's science and technology to catch up with advanced world standards as quickly as possible.

We can see from this that suitably advanced technology is a scientific concept that eliminates one-sidedness. However, it is insufficient to realize only this point. Even more important is that we must establish suitably advanced technology as an important guiding ideology for China's importation of foreign technology.

The Characteristics and Significance of Suitably Advanced Technology

I. Suitably advanced technology is characterized by different levels of technology and reasonable structures, and it can promote the improvement of China's science and technology standards from all aspects.

World science and technology, and especially the history of the development of science and technology in industrially developed countries, have shown that multi-level production forces and multi-level science and technology co-exist, they are the objective process by which production forces develop and science and technology progress, and this is also the situation for China's science and technology. The primary reasons multiple levels of technology co-exist are:

A. Science and technology have strong continuity and inheritance. Today's science and technology have developed from yesterday's science and technology. Continuity and inheritance reflect the internal relations in the development of science and technology, and these internal relations chiefly appear in two aspects: one, a technology will have a developmental process from the discovery of its principles to laboratory research, all the way to industrial application; two, a technology is a process of continuous development from the lowest levels to the highest. But in the developmental process the shape of each stage of development will be retained, which gives rise to differing levels. As for example with production technology equipment, the developmental tendencies are always: from manual labor to semi-mechanization, and mechanization, then from semi-mechanization and mechanization to semi-automation and automation. But actually, even in situations when the level of automation is rather high, semi-mechanization and mechanization cannot be eliminated, and even in certain cases manual labor cannot be done away with.

B. A new technology always breaks though from a particular sector, only after which can it extend to other areas. This extension to other sectors requires a process that is either long or short, which gives rise to conditions in which differing levels of technology appear and co-exist. For example, integrating the mechanics and electronics on technical equipment begins first with metal cutting machine tools. In the early years of the 1950's, in order to process military machine components with complex shaping and high requirements for accuracy, the United States designed and built numerically controlled machine tools. Because there were many advantages to this type of machine tool over regular machine tools, they gradually came to be used in machining for civilian industries. At present, not only have numerically controlled machine tools continued to develop, but advanced technology with integrated mechanics and electronics has come to be applied to much technical equipment. However, whether people are replacing obsolete equipment with new technical equipment or are using new technology to transform existing technical equipment, either takes time and each is a process. Therefore,

among the technical equipment currently possessed in China, although that with electromechanical integration has continued to increase, regular technical equipment of different standards is still much in evidence. The process by which this proportion constantly changes is just that process of the dissemination of new technologies.

C. Because of the gaps in technical bases created through history, different areas have different technical levels. China can be seen as having generally three situations: the material technical base is quite strong and the level of technology is quite advanced; there is a certain material technical base and the level of technology is average; the material technical base is rather weak and the level of technology is backward. In this way, and looking at it from the point of view of the entire country, there have come to be technical structures at different levels. There are only a few coastal cities and established industrial bases where the level of technology is comparatively advanced, and the majority of areas still have average levels and backward conditions.

The strategic goals for the development of China's science and technology ought to be to allow science and technology a full scale improvement, so that it may catch up to advanced world standards. Looking at it from one angle, by full scale we mean that the level of science and technology in every sector and area should improve in all aspects; from another point of view is meant that the technology at each level achieve a full scale improvement, and that it take the path of science and technology developing simultaneously at different levels. The concept of suitably advanced technology is just this requirement for simultaneous development at different levels.

The path of simultaneous development at different levels is in accordance with the rules of scientific and technical development and also coincides with our national situation. This is because: 1) Generally speaking, traditional technology is the base upon which traditional technology is universally used, and with no development in traditional technology, new technology would be just castles in the air. Especially for China, where the levels of technology for the vast majority of areas are at a state of average or backward, and even in areas of relative advancement there are still great gaps when compared to foreign countries. This sort of situation means that China's current traditional technology is in a commanding position, while the advanced, and especially the rising new technologies, are very weak. In implementing China's science and technology modernization we must seriously consider and hasten the development of traditional technology. Only in this way can a stable foundation be laid for the development of new technology, and can development funds be provided and accumulated. 2) Development of advanced and rising new technologies also put new vitality into the development of traditional technology. The history of industrial development has told us that constant changes are caused in all industries and all products by the adoption of new technology. The integration of machinery with electronics is the most representative example. Traditional machine processing equipment, when outfitted with computer control, can add features to the equipment, expand its processing scope, improve product quality, improve labor productivity, and lighten the intensity of labor.

II. Suitably advanced technology puts advancement in an extremely important position, one characterized by extraordinary development, and that can quicken the process of China's building toward modernization.

In importing foreign technology, the final goal is to borrow from the experiences of foreign countries, to seldom or never make the mistakes that foreign countries have made, to directly or indirectly use the scientific and technical achievements of foreign countries, to close the gaps with foreign countries as quickly as possible, and to hasten China's modernization, but absolutely never to get into a race with developed nations that maintains a constant lag. This is to say that we want a certain measure of extraordinary development. Because suitably advanced technology has gotten rid of one-sidedness, it has placed advancement into an extremely important position, for which reason, by actively importing suitably advanced technology we can generate the effect of extraordinary development, which will allow the extraordinary existing base of China's science and technology to approach or reach advanced world standards.

The histories of economic and technical development both here and abroad have all shown that countries with backward economies and technologies can exhibit extraordinary progress and can catch up with and surpass economically and technically advanced countries by importing foreign technology. As for example with England, which only by inheriting the science and technology of European mainland countries like Italy, Holland, and France, and making great progress with technologies like the steam engine, steel refining, and weaving, could become the world's leading industrial nation. The industrial revolution in Germany was later than in England and France, but Germany learned from the advanced experience and technology from England, and afterwards reigned supreme, in economic power exceeding that of England. The United States made use of immigrants from Europe, learned European technology, and made new breakthroughs in some major scientific and technical fields, and economically and technically caught up with and surpassed the industrially developed nations of Europe. After the Second World War, the example of the economic and technical development of Japan is even better able to elucidate the problem. As the Second World War concluded, Japanese industry was on the brink of paralysis, and the economy fell 20 to 30 years behind that of the European and American developed nations. Beginning in the 1950's, Japan imported foreign technology on a large scale, gathering together nearly all the technical achievements that had been developed in the half century to eventually become one of the major nations with a capitalist economy. According to statistics, by actively importing technology, in the process of catching up to and surpassing advanced world levels they saved approximately two-thirds of the time and 90 percent of the research funds. By the end of the 1960's, levels of technology in the industrial sectors of steel, ship building, vehicles, petroleum engineering, synthetic chemical fibers, and household appliances, had either reached or surpassed the European and American developed capitalist countries in less than 20 years, and had fundamentally turned around a technically backward situation. In recent years the pace at which China has imported advanced technology has already quickened, as for example in the Ministry of Machinery Industries system, which in the nearly 7 year period from 1978 to 1984 imported more than 500 technologies, a sizeable portion of which have already been assimilated and

mastered and have put been into industrial production. Importing technology has had a positive effect on technical progress in the machinery industries, winning for China 10 or 20 years time in catching up to international advanced standards in these technical fields, and obtaining rather good economic results.

Suitably advanced technology puts advancement into an extremely important position, and has a very great significance regarding how China is to correctly deal with the new world technical revolution. We are faced with a new world technical revolution that is developing rapidly, and for us this is both a challenge and an opportunity, for how to meet the challenge and utilize the opportunities is directly related to the larger problem of quickening the construction of socialist modernization. Beginning from this concept of suitably advanced technology, we can very naturally consider the importation of new technology as part of the importation of technology. In some new technical fields we can then begin from the same starting line as developed countries; proceeding from China's actual requirements and capacity for assimilation and absorption, we are in urgent need of developing and establishing new technical professions in China, especially to use new technologies to transform our traditional industries.

III. Suitably advanced technology is characterized by its fast transformation into production forces, and it can give full play to economic results as quickly as possible, and can accumulate funds for the state.

In importing technology, the important thing is to import technical materials and blueprints that embody research, design, and technical methods. This kind of technology in its intellectual state must be transformed before it can become actual production forces. Even if together with importing technology processing equipment and testing equipment is purchased at the same time, only after technology in an intellectual state has been transformed can it actually function as a productive force.

The final goal for the importation of technology is to develop China's production forces. Therefore, assimilation and complete understanding allows imported technology to be quickly transformed into productive forces, and is thus a key to the importation of technology. There are examples of this both in this country and abroad, where after a technology has been imported it cannot be assimilated and completely understood even after a long time, it cannot quickly be transformed into a productive force to provide products for society, and if people wait until it can provide products for society, the next generation of foreign technology has already entered the marketplace. This then loses the real significance of importing the technology, creates a great waste of the nation's funds, and gives rise to vicious cycles in the importation of technology. One of the main reasons for appearance of this sort of phenomenon is that suitably advanced technology had not been the guiding ideology behind the importation of technology.

The fundamental requirements for suitably advanced technology are that it take the national situation into full consideration, that it proceed from the actual technical base and support of the local department, the local region, and the importing unit, and their capacity for assimilation and absorption.

It must also eliminate the two one-sided tendencies of over emphasizing advancement and neglecting suitability, and one-sidedly stressing the base while neglecting advancement. Suitably advanced technology imported according to these basic requirements can quickly be transformed into production forces, and very quickly to develop economic results so that the state might accumulate funds.

The facts about China's importation of technology over the past few years have shown that whenever the guiding ideology is correct and suitably advanced technology is imported, then results are good; on the other hand, when this guiding ideology is violated, the results are not good. For example, the Hangzhou Oxygen-Producing Machinery Plant is a key enterprise in China's oxygen producing machinery business, with over 20 years experience in manufacturing large-scale oxygen-producing machinery. But because its design and manufacturing technology was backward, the standards of its products were always less than the international standard. To change this backward situation, this plant imported the complete manufacturing technology for 10,000 cubic meter oxygen producing machinery from the Linde Company of West Germany, signed an agreement for cooperative production, and in less than 4 years had absorbed and mastered the international technology. Then, drawing inferences from what they had learned, they applied advanced technology to oxygen producing machines of various specifications. They used the new technology to manufacture two oxygen producing machines for the Baoshan Steel Mill and the Jinshan Petroleum and Chemical Engineering Main Plant, the technical performance of which is equal to the level of similar international products. Comparing these to the old products of this plant, where the former ones could be in continuous use for 8 or 9 months, that was increased to one year and more. The 0.72 kwh of power needed to produce 1 cubic meter of oxygen was lowered to 0.52, so that a 10,000 cubic meter oxygen producing machine operating for 1 day could save 48,000 kwh of electricity. And another example. The Shenyang Water Pump Factory is an established water pump factory that imported the water pump manufacturing technology for power station boiler use from the West German KSB Company, and went into cooperative manufacture with the foreign company. After assimilating and mastering foreign technology in only 2 years time they were able to produce a boiler use water pump for a 300,000 kw generator set. This saved at least 10 years from the process of designing it from scratch themselves.

Principles for the Selection of Suitably Advanced Technology

Since suitably advanced technology is this important for China's scientific and technical progress and for quickening the construction of socialist modernization, as we import technology, we must earnestly and self-consciously select suitably advanced technology. From the point of view of current and future scientific and technical development, we should abide by the following principles when selecting suitably advanced technology:

I. The principle of economic reasonableness and economic results.

We should make two comparisons: one is a comparison between the two methods of self design and importing technology. As to whether a technology is to be self designed or to be imported from abroad, we should see which method would

save the most money and also be fastest at obtaining new technology. To import technology from abroad that is already mature is certainly a shortcut to accelerating the progress of China's technology, but it should not eliminate reliance on self design in certain aspects to obtain results that are better than from importing the technology. This is to say that if we do serious feasibility studies and compare the programs, we cannot say that in all cases everything should be imported from abroad. If it is technology and equipment urgently needed by the state, it will be much more expensive to import the technology than to make it ourselves, but much time could be saved. In this situation, money must yield to time in order to meet national exigencies.

II. A comparison of the money spent to import a technology with the economic income generated after importation of the technology.

If we are to gain the most economic earnings from the least expenditure for importation, we must evaluate the economic results of the importing unit and society's economic results. Much imported technology can advance an enterprise's design and manufacturing technique, can improve production efficiency, and consequently can improve the economic results of the unit importing the technology; the products produced when the unit importing the technology uses the new technology have the advantages of good performance and high quality, and they also will have improved the economic results of the units using the products, and will therefore have improved the economic results for society. This is of course the most ideal. But it often happens that the economic results for the unit importing the technology are not particularly outstanding, while those of society are. This then requires us when comparing the two situations to join the economic results of the unit importing the technology together with the economic results of society. Whenever the economic results of society are clear, while the unit importing the technology cannot realize a greater economic gain, or cannot realize a gain at all, the state should subsidize this effort.

III. The principle whereby importing technology will transform the existing industrial base.

This principle is the same as building the national economy by focusing on internal expansion and reproduction. The outstanding contradictions existing universally in our industry are: 1) Science research is backward. This is primarily apparent in our incomplete science research facilities, where methods are obsolete, where new products are slow to develop, and where there are difficulties in product renewal. 2) Design is backward. This manifests itself primarily in backward design thinking, backward design methods, and backward means of design. Consequently, this leads to products being insufficient before they begin and to long lasting design periods. 3) Techniques are backward. This is apparent for the most part in continued use of many techniques and methods that are no longer used abroad, which gives rise to low productivity, high expenditure, and product performance and quality that cannot be guaranteed. 4) Management is backward. This shows itself in backward management methods and management means, which lead to management confusion and affects economic results. If we can change the backward situations in the areas described above, they ought to become the

focus of the importation of technology, while if this point is well taken care of, things will well embody the principle of being suitably advanced.

IV. The principle of importing the newest technology in a planned and focussed way and of developing China's rising new technical professions.

Developing China's rising new technical professions is for the most part a two part subject: 1) As quickly as possible we must establish new domestic professions. As for example with electronics, which whether it is a matter of improving products or techniques or improving management, in neither case can we fail to use computers, especially microcomputers, because we are currently facing the great mission of technically renovating our existing industrial base. From now on, there will be a great need by each sector of the economy for computers. Therefore, we must establish an advanced Chinese computer profession by importing technology. Or another example, new types of materials. With the rapid growth of this country's steel products, we are restricted by coal mining and electric power, while with future development of our energy resources we will be hard pressed to satisfy the needs of the development of our national economy. Because of this, we should develop as quickly as possible new types of materials that consume less energy, which is an important means by which to resolve insufficient provision of raw materials. 2) Some new technologies are less restricted by traditional technology, and we can keep pace with the foreign industrially developed nations. Of course, this kind of new technology must be selectively carried out, and we must begin with fields that require little investment, and cannot just fully spread out without regard to national capabilities.

By developing rising new technical professions we can generate direct results of surpassing development that can in some areas serve to guide traditional industries through the surpassing development of technical transformation.

V. The principle of combining transfer of the rights to foreign technology with transfer of the rights to domestic technology.

That we import foreign technology is because we are not on an equal footing with foreign scientific and technical development, especially where China's science and technology universally lag behind that of developed nations. As we have said above, the degrees to which China's domestic science and technology are developing are not equal, since interior areas generally lag behind the coastal areas and established industrial bases. Because of this, at the same time that we pay close attention to transfer of the rights to foreign technology, we should also be aware of transferring domestic technology, for backward areas should actively import technology from the coastal regions. If we work in this way, it will be beneficial both to the state and to enterprises. Another aspect to transfer of domestic technology is that civilian industries will actively import technology from the national defense industries. Because of the results from major national investments, in many aspects the national defense industries are more advanced than the civilian ones, and many technologies that have been long time stumbling blocks for civilian industries have been successfully dealt with for some time by the national defense industries. Therefore, we should break through the sectoral blockades and barriers between national defense industries and civilian

industries as quickly as possible, and should broadly open up scientific and technical exchanges between the national defense industries and civilian industries. Relevant departments ought to open up channels for the import of advanced technology from the national defense industries by the civilian industries, and encourage and support technical exchanges between these two sectors.

12586
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NATIONAL DEVELOPMENTS

SCIENCE FUNDING SYSTEM BENEFITS BASIC RESEARCH

Beijing GUANGMING RIBAO in Chinese 27 Dec 85 p 1

[Article by Wen Zhenshun [3306 2182 7311]: "Implementing the Science Fund System Benefits Basic Research"]

[Text] Implementing the science fund system is beneficial to support of fundamental work (basic research, hereafter) in basic research and applications research. This was the initial experience out of the summation of the fourth conference held by the Science Fund Commission of the Chinese Academy of Sciences on 26 December.

The Chinese Academy of Sciences Science Fund is a national natural sciences fund established with the approval of the State Council in 1982.

In the past 4 years, the science fund commission has granted financial aid to 4,424 projects, the total of subsidies has been 172 million yuan, divided approximately among 47 percent of the projects applied for and for 23 percent of the funds requested.

It is the belief of this commission that the primary strengths of the science fund system are: 1) that it can provide a reliable guarantee of funds for the stable development of basic research; 2) that it will aid in improving the results from science research investment; 3) that it enhances the feelings of responsibility among scientific researchers; 4) that it can promote competition in basic research, and can provide even more opportunities for the maturing of young researchers and for outstanding talent to emerge; 5) that it can accelerate cooperative research among researchers in different disciplines and from different units and the exchange and permeation of scholastic thinking, as well as the reasonable movement of scientific researchers; 6) that it will be beneficial in giving full play to the advisory roles of specialists in the decision making process for science research management, avoiding inappropriate administrative interference. However, there are still problems with the science fund system. Comrades participating in the conference gave their suggestions for improving the science fund system.

Lu Jiaxi [4151 0857 6932], chairman of the Science Fund Commission, participated in the conference, which was chaired by deputy directors Yan Dongsheng [0917 2639 3932] and Xie Xide [6200 1585 1795].

12586
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NATIONAL DEVELOPMENTS

RESTRUCTURING OF S&T SYSTEM BRINGS GOOD RESULTS

Shijiazhuang HEBEI RIBAO in Chinese 7 Jan 86 p 1

[Text] Through thorough implementation of the resolution by the CPC Central Committee regarding restructuring of the science and technology system, last year 86 of the 138 research units in this province put the institute director responsibility system into effect, 96 implemented the topic contract system, taking responsibility for a total of 1,529 research topics, a 42 percent increase over last year; 479 achievements were disseminated, which is 29 percent more than last year; net income from technology reached 1.05 million yuan, which is up 40 percent over last year. Twenty-two of the 61 development research units have economic independence, and 30 of the others have reduced operating expenses by 1.78 million yuan.

Expanding the autonomy of research institutes, and using "without restraint" to promote "change."

On the basis of the 1984 readjustment of science research unit leading groups, this province last year expanded the autonomy of research institutes. Based on a survey of 120 science research units, 91 units have tasking authority for readjustment of direction, 97 units have science research planning authority, 96 units have authority for fund utilization, 104 units have organization creation authority, 98 units have the authority to transfer the rights to technology, and 66 have management authority over personnel affairs. This is the premise and basic condition for smooth operation of the restructuring.

Restructuring allocation management methods for operating expenses, giving full play to the promotional function of economic levers on the restructuring.

The provincial science and technology commission has required that development research units gradually reduce operating expenses and that other research units practice operating expenses responsibility. They have also worked out corresponding methods of reward. Actual practice has shown that by putting these methods into effect, achievements from science research can be quickly transformed into production forces. According to a survey of 61 development research institutes, technical income last year had already reached 7 million yuan. Since the Tangshan Electromechanics Research Institute became a restructuring experimental site in 1984, of the 54 science research projects

that have been arranged there, 46 have been topics in service of small to medium-sized enterprises.

Models lead the way, promote in-depth development of restructuring.

Summing up and disseminating the experiences of units from the Provincial Microbiology Research Unit and the Shijiazhuang Building Materials Research Institute at provincial science and technology working conferences has put a new prospective on the restructuring of science and research units: one thing has been that it has broken through barriers between regions and departments and has begun to transcend regions and departments to provide services to society; a second thing has been widespread respect for developmental research in appropriate technologies, with attention paid to the dissemination and transfer of achievements and to complete sets of technology; and third has been the great increase in research projects.

The joining of developmental research with production, promoting the transformation of technical achievements into production.

Through the means of organizing technology trade and of combining efforts in tackling key problems, the provincial science and technology commission and relevant departments have acted as go-betweens and links to promote the joining of scientific research with production. As the development of restructuring has deepened, many research units have solicited integration through advertisements and publicity; they have sought integration through technology markets; and they have striven for integration through provision of high quality service. For more than a year now the provincial Vegetable Research Institute has taken up 32 joint projects with 27 units, they have disseminated 8 achievements, have developed 10 technologies, and they have created more than 1 million yuan in economic results for society, and the research institute itself has increased its income.

12586
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NATIONAL DEVELOPMENTS

RENOVATION OF EXISTING ENTERPRISES URGED

Tianjin JISHU SHICHANG BAO in Chinese 3 Dec 85 p 1

[Text] What reporters have learned from the 3d National Working Conference for Enterprise Technology Advancements: During the "Sixth 5-year Plan," China quickened the pace of carrying out the technical restructuring of existing enterprises. The growth rate in investment for technology transformation has already exceeded the growth rate for capital construction investment, and the tendency toward new construction of enterprises, outward expansion, and a neglect of technical transformation that has characterized production construction for some time has begun to turn around. From the central authorities down to the local areas, a great deal of work has been done in the technical transformation of existing enterprises, especially in the areas of improving product quality and technical standards, increasing the types of products, saving energy, and improving capacities for export and the earning of foreign currency. Products in short supply have been increased, which has allowed for a readjustment of structures.

From 1981 through 1985, total national investment in technology transformation has been more than about 140 billion yuan, of which more than 100 billion has been allocated by the state. This has focused on arranging energy conservation and coal-for-oil substitution projects and has concentrated on measures to increase production of products for the light industry and textile markets, for machinery and electrical products in short supply, for entire complements of raw materials, for enhancing transportation and shipping, and for mining safety. During this period the state has also begun to grant 35 billion yuan in special loans for light industry and textiles, energy conservation, machines and electricity, vehicle and ship purchase, and raw materials. To increase the pace of technical transformation, there were additional grants in 1984 of discounted loans. Beginning in 1983, the state allocated special foreign exchange to import advanced technology to transform existing enterprises, and also formulated plans to import 3,000 items in 3 years. At the same time, it began running experimental sites in Shanghai and Tianjin with expanded authority to import technology, and along with this, it also expanded to other coastal cities and to cities with experimental sites in system restructuring. It quickly put new perspectives on the importing of technology to transform existing enterprises.

Based on materials supplied for relevant areas, during the "Sixth 5-year Plan" it is estimated that 200,000 projects were built and put into production, of which more than 500 were worth more than 10 million yuan, with gains in fixed assets of 110 billion yuan, which is about one-fifth of the original value of fixed assets for state-run enterprises throughout the nation by the end of 1980.

During the "Sixth 5-year Plan," China also hastened programs to use foreign capital to transform enterprises. Through Chinese-foreign joint ventures, Chinese-foreign cooperative ventures, compensation trade, and other projects, China has brought in technology and management methods, and imported equipment, which have had positive effects on the improvement of product quality and economic results, and have given impetus to equipment renovation.

During the "Sixth 5-year Plan," as restructuring of the economic system developed and as existing enterprises played their full roles, and as the potential of older enterprises has been tapped, there have already been clear results in economic construction. Of increases in industrial gross output value for this period, two-thirds depended upon technical advances in existing enterprises and upon enterprise reorganization. Dependence upon advances in enterprise technology will have a major effect on invigorating the national economy.

12586
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NATIONAL DEVELOPMENTS

NATIONAL DEFENSE INDUSTRIES STRESS CIVILIAN PRODUCTS

Beijing GUANGMING RIBAO in Chinese 24 Dec 85 p 2

[Article by Peng Ziqiang [1756 1311 1730]: "National Defense S&T Industries Enhancement of Civilian Production Invigorates Urban Markets"]

[Text] During the sixth 5-Year Plan, national defense science and technology industries diligently implemented the principle of "military and civilian integration," actively organizing the production of civilian goods in short supply. This served the national economic construction and the material life of the masses and strongly supported urban markets.

As for example in the area of coal industry machinery, military industry enterprises have gone into the production of entire sets of equipment for excavation, for safety and self protection, for loading and unloading, and for shipping. They have accumulated 28 sets of large scale mining hydraulic supports that must be imported for production, as well as 250,000 sets of mining protection devices; machinery for loading, tunneling, bulldozing, and vehicular transportation are currently under trial production. In the areas of transportation and shipping, the military industry enterprises have created vehicle models other than medium size because of the situation in the Chinese manufacturing of vehicles where "there is a lack of the heavy and few of the light." These include heavy-duty, light weight, miniature, and vehicles for mining use, as well as various special use vehicles, all of which are in production. The Ministry of Aeronautics Industries has also produced types of shipping machines, specialized machines, and helicopters, and five types of extra-light and light aircraft. They have begun to provide these for civilian use and for the use of relevant departments.

Various departments in the national defense science and technology industries are vigorously producing light industry commodities to satisfy the demands of urban people to improve their material lives. Over the past few years they have accumulated or produced 1.5 million motor vehicles, which is more than 70 percent of national production. And they have manufactured more than 40 kinds of medical and hygiene equipment, and are as well just in the process of manufacturing a batch of new model medical instruments, as for example a dislocation scanner, a very high speed centrifuge, and a laser cancer treatment machine.

Military industry enterprises have already provided more than 60 kinds of spare parts for primary maintenance of complete sets of imported chemical fiber and steel rolling equipment, which has saved a great deal of foreign exchange. As for example a hydraulic reservoir spare component for the 1.7 meter steel rolling machine provided by Factory No 527 of the Ministry of Aeronautics Industries, which in its 3 year use has saved more than $1 million. The electro-hydraulic servo valve used in this steel rolling machine was successfully produced by a certain research institute of the Ministry of Aeronautics Industries, the performance and quality of which was completely at the level of similar international products.

As the military industries are producing civilian products "in short supply," they are supporting a large group of small to medium enterprises through various means like transfer of the rights to the achievements of scientific research, sale of scientific research products, and transfer of know-how, which has helped them to take off economically.

12586
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EMERGENCE OF CIVILIAN S&T DEVELOPMENT ENTERPRISES DESCRIBED

Beijing RENMIN RIBAO in Chinese 1 Feb 86 p 3

[Article by Xiao Guan`gen [5135 7070 2704]: "A Number of Civilian Science and Technology Development Model Enterprises Are Springing Up"]

[Text] Fifty civilian science and technology development model enterprises supported by the Shanghai Science and Technology Development and Exchange Center have already become an important force in the enlivening of technology markets. Last year they signed more than 1,000 contracts of various types with production units, for a total amount of 100 million yuan. Among them, 134 projects involved 33 enterprises developing technical achievements that were "short, even, and quick," 10 involved applications for patents, and there are 89 factories jointly operated by small to medium-sized enterprises in this city and outside areas and by town and township enterprises.

Funding and preparations were made for the construction of these science and technology development model enterprises by a number of scientists and technicians from the former units who were not institute directors, as well as by scientists and technicians in retirement or early retirement. These enterprises chiefly engage in technology development, technical service, technical consulting, technical training, and packaged engineering contracts. Based on market requirements, they select and establish projects for development, many of which are projects that national research units are unwilling to take up or cannot be bothered with, and they are done with little investment, fast turnover, and with quick results. After the "infrared contactless power igniter," successfully developed in 4 months time by the Creative Electronic Engineering Company, was used on vehicle engines, fuel consumption was reduced by from 7 to 10 percent. The "universal vision corrector" of the Institute of Modern Information Technology has had good results when treating myopia, cross-eye, and wall-eye in youth. Within a month after going on the market, there were more than 5,000 telegrams requesting rights to transfer of technology and for resale of the product.

As civilian science and technology development model enterprises are developing technical services, they are particular about speed and quality in order to gain a good reputation. Because dust removal equipment at the Shanghai Dongfeng Needle Plant was deficient and it had no sound insulation, both sound and dust pollution were serious problems, to which surrounding

residents objected strenuously. The plant decided to commission the Engineering Technical Equipment Outfitting Company to resolve the pollution problem. The company immediately sent people to the site for a thorough inspection and proposed a control program. Within this rather short time, they solved both the dust and noise problems.

These civilian enterprises are all in their initial stages. To help them maintain proper directions and to develop healthily, the Shanghai Science and Technology Development and Exchange Center has established special structures to strengthen management, has formulated some rules, and has corrected in time some mistaken ways of doing things. Beginning in October of last year, they carried out an audit of financial affairs and a full-scale reorganization in concert with city business and tax revenue departments.

12586
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NATIONAL DEVELOPMENTS

ROLE OF S&T CONSULTING WORK DISCUSSED

Beijing KEYAN GUANLI /SCIENCE RESEARCH MANAGEMENT/ in Chinese No 4, Oct 85 pp 7-9

/Article by Zhao Yingchun /6392 5391 4783/, Heilongjiang Province Science and Technology Association: "Scientific and Technological Consulting in the New Situation"/

/Text/ Scientific and technological consultation in Heilongjiang began to develop extensively after conscientiously implementing the directive of Zhao Ziyang, President of the State Council Zhao Ziyang's directive of 31 August 1980: "Scientific and technological consulting service work is very important, it is a form for scientific and technological sections to move towards socialization and experience should be summarized constantly." There are science societies engaged in it, there are grassroots level science and technology associations engaged in it, there are science and technology associations systems engaged in it and they are interlocked in all directions to form a huge organizational network.

I. Scientific and Technological Consulting is a New Thing on the Leading Edge of Reform

The time when scientific and technological consultation service was just taking its first steps was during reform of the national economic system, implementation of scientific and technological systems, and when a series of problems in understanding had not yet been resolved, and capitalizing fully on the advantages of the special cross-linkages, scientific range, density of knowledge, abundance of talent and the detached and unrestricted and unbiased nature of scientific and technological mass organizations broke through the limitations of unit, section, and regional ownership systems to promote the rapid transformation of science and technology into a productive force, realize the commercialization of technological results, and push forward the probing, test range, and developmental undertaking which emerged from subsequent reform of the scientific and technological system. It was an undertaking that got quick results with little investment, had the support of the people and was in line with the will of the people, and had significance for the public good of society, it was an essential constituent part of the comprehensive reform of party and country, and it was a new thing for socialist modernization. Therefore, scientific and technological consultation service developed very fast and increasingly displayed a powerful vitality.

In 1984, scientific and technological consultation service organizations at all levels within the provincial scientific and technological association system did a great deal of work for leadership policymaking consultation, for large project appraisal, for medium- and small-scale enterprise technological service, and for providing information to scientific and technological and specialist users. Over 2,100 scientific and technological consulting projects were carried out during the year in communications, energy sources, environmental protection, agriculture, water conservancy, and medicine and public health with direct economic benefits to the nation of over 380 million yuan. Among them, hard vinyl floor tiles, hard surface cold forging, Baidun /4102 0903/ deoiled milk powder, Haolanghe self-supplying power station, Heping Highway overhead crossing bridge and defective welds in Gexi heating plates all of whose economic and social benefits are very clear and earned the high regard and welcome of party agencies and enterprise units at all levels. Up to the end of last year, the number of scientific and technological consultation service organizations at all levels in the provincial scientific and technological association system had increased to 438 with a staff of over 2,000 specialists.

Scientific and technological consulting has also encountered some problems under the new situation. Beginning in mid-1984, "companies" and "centers" of all types appeared in society in rapid succession. Some operated under the banner of "reform," utilizing the name of "company" and "center" for swindling, buying and selling for a profit, and for trafficking in state-controlled goods and materials interferring in the smooth progress of system reform. Their phony consulting has created many bad influences. In some areas such as management content, range of activity, distribution of rewards, and professional administration to varying degrees there are some problems where the purposes and demands of the consultation do not coincide. These should all be corrected. The /1984/ Central Document 27 (below, Central Committee Doucment 27) issued by the Central Committee of the CPC was correct and timely. Through thorough implementation of this memo, while correcting new incorrect style, true and false can be distinguished, the correct can be upheld and the incorrect driven out, to wipe out thoroughly such corrupt things as policy violations, interference with reform, and feathering nests at public expense. At the same time, it is an examination and a test of our scientific and technological association system's consulting. If the pace is correct, then it will continue to develop; if mistakes have been committed, they should be resolutely corrected; everything that goes against the Central Committee Document 27 can be thoroughly banned. To ensure the healthy development of scientific and technological association system consultation work, consulting departments at all levels in this system should resolutely and conscientiously implement the Central Committee Document 27 and should report the implementation situation and the problems encountered to successively higher levels to facilitate summarizing experience and continue to advance.

II. We Should Have a Clear Understanding of Scientific and Technological Consulting Work Under the New Situation

A scientific and technological consulting company or center is an "intellectual property" which adopts a definite economic means, promotes the integration of

science and technology and economic construction and emphasizes service. Its administrative content and business scope do not permit illicit purchase of goods and materials which are in short supply nationally, even less does it permit speculative buying and selling; nor is its aim the direct production of commodities for sale in the market. As concerns the integration of technology and trade, the integration of technology and the economy and the commercialization of technological results in consulting work, although "trade," "economy," and "commerce" are all involved, they are still linked to technology and thus cannot change its basic attributes. For this reason, scientific and technological consulting service companies and centers are neither commercial businesses nor enterprises, but are a third type of property which is engaged in the transfer of intelligence, and from the very first day of its birth, sanctioning departments have clearly stipulated that they are units under the leadership of scientific and technological associations or societies. The primary focus of Central Committee Document 27 was use of the authority in hand in the name of "reform" without regard for the interests of the party and nation to pursue the private ends of the unit, small collective and individual and blinded by lust for gain unscrupulously harmed the nation, hoodwinked the masses and sought private gain at public expense. But our consulting service departments were set up several years ago already in accord with the spirit of Premier Zhao Ziyang's directive and the regulatory system it now has in effect was implemented after approval by the main leadership departments of the nation and it is different from the commercial and enterprise "companies" and "centers" which were all the rage in society. It conforms to the spirit of scientific and technological system reform and its direction is on the right track. It is necessary to enrich it continuously, improve it constantly, strive to strengthen it, and develop it actively. For this reason, it is necessary to clarify the following several problems in understanding.

1. We should distinguish between correcting incorrect styles and problems which appear in the progress of scientific and technological consulting. Even now, scientific and technological consulting is considered a newborn baby and there are many places which have not been adequately improved. However, its existence and development are beneficial to the prosperous development of the nation, are beneficial to the prosperity and wellbeing of the people, and are beneficial to the building of a socialism which has a Chinese character. This is fundamentally different from the erroneous method of viewing only the private gain of the department, small collective, minority or individual and in the process forget its significance.

2. We should distinguish between normal income from engaging in consulting work or concurrent employment in accordance with the stipulations and illegal gains. Carrying out one's own job without encroaching on the national or collective economy and technological rights and interests and engaging in consulting or concurrent employment with the approval of the unit conforms to the demands of the Central Committee's decision to reform the scientific and technological system and should be compensated according to the regulations. Receiving a little more due to making a practical contribution or even being granted a large bonus for a major contribution is perfectly reasonable. This cannot be mentioned in the same breath with such erroneous behavior of illicit purchase of goods and materials which are in short supply nationally, speculative buying and selling, and engaging in illegal income.

3. We should distinguish between making good on a contract after the project is completed and taking advantage of reform to award bonuses indiscriminately. Completion of a contract project converts science and technology into practical productive forces obtaining economic benefits and making a contribution to the four modernizations. Awarding compensation in accordance with contract stipulations is natural. This is different in essence from such behavior which goes against financial and economic regulations as inventing names, scheming to pick up some ready cash, and distributing money and goods under false pretenses.

4. We should distinguish between engaging in pilot project with the approval of upper echelons and in line with the demands of upper echelons and exploring the laws of consulting work on the one hand and damaging party policies in force and interferring with state plans for consumer capital. Pilot projects are carried out in a few or individual consulting departments or units with the aim of gaining experience and do a good job of reform work by using experience in single areas to promote work in the entire area and even if there are errors or complete failures, it will not and cannot influence the overall situation. Thus, it is natural that some pilot projects may conflict with policies in force but it cannot have an impact on the overall plan for consumer capital.

If we do not clarify the above problems and uniformly regard developing advancing consulting work as a new incorrect style but strangle it in the cradle, that will be going against the spirit of the Central Committee's reform. At this critical time, scientific and technological associations should take advantage of the party's "bridging," "linking" and "helping" roles to safeguard thoroughly the initiative of scientific and technological workers to search freely for topics in production practice.

III. Correctly Handling Problems in Going Forward, Developing a Generally Good Situation

Scientific and technological consultation service is a new undertaking and in carrying out the stipulations of the original document it is necessary to discover problems and research problems and summarize things which have some regularity and supplement and improve them. However, before the upper echelons stopped using it or had not yet put out new stipulations, the stipulations of the original document were still valid. When contradictions with the actual situation or certain policies were encountered they could be reported to successively higher levels. If there were some clear stipulations in the Central Committee document, then the Central Committee document should be taken as correct. The professional scope, the system of distributing allowances and bonuses, and tax breaks have not changed. Consulting departments run by societies are a subsystem of the scientific and technological association consulting organization and they are a unified entity and the parent company or center which already has a license need no longer make this demand on consulting departments run by societies to comply. Besides, in the light of the nature of the scientific and technological service company or center, whether or not to do business this way is a question that still requires further study.

Concerning the question of agency working personnel engaging in consultation service work, Sec 1 of Art 7 of the Document 83 /1983/ issued by the Heilongjiang Government Administration stipulates: "On the condition that their own work tasks have been completed and with the agreement of their unit, scientific and technological personnel may accept temporary employment from outside units. The monthly income is not to exceed the individual's monthly wages, the individual's unit be exempt from proportion deduction." In the spirit of Secretary Li Li'an's /2621 0500 1344/ talk at the Provincial Scientific and Technological Work Conference, substantial rewards for scientific and technological personnel cannot be viewed as an incorrect style under the new situation. Thus, for agency scientific and technological personnel to participate in consulting work in line with stipulations and to receive compensation is fair and reasonable and they cannot be censured for it. Although consulting companies or centers are by nature not commercial businesses or enterprises, until the Chinese Scientific and Technological Association issues a new opinion, agency leaders without exception should not hold two posts concurrently (those who are holding two posts concurrently should stop).

Scientific and technological consulting service work developed in the past under rather difficult conditions and now the pace has increased and the way also has fundamentally cleared up. The Central Committee of the CPC's "Stipulations on Reform of the Scientific and Technological System" said that we should actively develop trade activity in technological consulting and technological service and this confirms even more that our development direction is correct. However, problems will always be encountered in moving ahead and we should permit errors in reform but we cannot permit no reform. We should take a positive attitude and use the party's policy, especially the spirit of reform of the scientific and technological system, to supplement, perfect, and support scientific and technological consulting service work, help them overcome difficulties, resolve problems and continue to move forward on the new journey.

There are now some problems in scientific and technological consulting work that need to be explored and resolved: One, the question of name. We are mass organizations that engage in consulting service and since in essence there are differences with "companies" and "centers," in name too our characteristics and properties must be appropriately reflected. Two, the problem of a board of directors. Consulting service board of directors is its highest organ of power, its existence produces a contradiction between the parent company or center and the leadership of the scientific and technological association committee, contradictions between the branch companies or centers and the leadership of the society's board of directors, yet abroad, the board of directors is also an organizational structure of a commercial nature. At present we should consider the need for the existence of this organizational level. Three, the question of licenses. Since consulting service is an intelligence conversion (intermediary) type unit whose aim is service, whether or not it definitely should have industrial and commercial licenses, since nationally there are many places which perform consulting service work but have not received licenses, this requires further appraisal from a legal standpoint. Four, the question of service channels under the new situation. Many of our original advantages were manifested under conditions in which

such problems as economically the lack of a relaxed, scientific and technological system operating mechanism. The reform of the situation challenged us and it is necessary to seek a new path for consulting service work. In addition, there are such problems as the form and tax revenues of industrial and mining consulting service and the professional scope of design unit consulting service organs. On the basis of practice, these problems must be conscientiously analyzed and researched, bases must be found, directions must be clarified, and at the appropriate time they must be solved.

8226/12228
CSO: 4008/2037

NATIONAL DEVELOPMENTS

HIGHER INSTITUTIONS IN S&T MARKETS DISCUSSED

Tianjin KEXUEXUE YU KEXUI JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF S&T] in Chinese No 11, 15 Nov 85 pp 32-36

[Article by Tao Weijiang [7118 5898 3068]: "Some Reflections on the Function of Higher Level Institutions in the Technology Markets"]

[Text] Socialist technology markets have been formed through the state, groups and individuals, and the integration of autonomy in technology trade and the support of administrative departments. Their appearance breaks up the former science and technology [S&T] situation whereby science research, production, and the economy were divorced from each other, and they create the conditions in which to resolve the abuse of having "two skins" over science and technology and economic construction. Also they have accelerated the movement of talent and the circulation of technology. Technology that circulates in the form of commodities will also propel forward the restructuring of the science and technology system, as well as the dissemination, improvement, and transfer of science and technology. Therefore, the future of technology markets is expansive, and of great hope.

China's higher institutions have assumed the dual functions of training high level specialist technical personnel and of developing science and technology. There are at present more than 390,000 teachers and science research personnel, among which are one-half of this country's high level intellectuals. They are training 80 percent of the nation's graduate students, including both the social and natural sciences. The curriculum is complete and there is quick access to scientific and technical information, and there is as well the capability to organize more classes, to solve comprehensive major problems in science and technology, not to mention the ability to open up new products, new technology, and new techniques for small to medium enterprises. Up until now, higher institutions have been awarded 56 prizes in the natural sciences, which is 45.2 percent of those awarded in the natural sciences, and have been awarded 221 prizes for inventions, which is 24.4 percent of those given throughout the country.

However, on the other hand there are still problems when one compares the abundant real technical capability with the effect on the technology market of enterprises, companies, and research academies (institutes) and also its direct role on social and economic development. The author feels that applied

science research in higher institutions should pay close attention to the following points.

I. Take the initiative in developing projects that are "short-term, within ones means, and show quick results."

Currently, township and town, and privately funded enterprises are developing quickly, but they remain technically weak and deficient in capital. They can only hope for large projects and large products but cannot attain them, even if larger enterprises have no particular interest in them. Especially for longer term projects and products, in fear that funds might lay idle too long, medium to large enterprises cannot keep up with changes in the market. Therefore, there is often the situation where medium to large enterprises are not very enthusiastic about the application and dissemination of scientific and technical achievements, but neither can small enterprises accept them (due to funding and technology factors); when the rights to technology are transferred, they dare not put up the capital, and even with the amount shared several ways they fear they will lose out, so it is difficult to make deals. But those small projects and small products where investment is small, development time short, results are quick, and there is a market for them, they just fit the demand and are taken up in a moment. The situation for higher institutions is often like this: some teachers are good at the theoretical research of basic science, and publish several papers each year; whereas, other teachers are better at taking on applied topics, and therefore, the science and technology management departments of higher institutions should emphasize both basic and theoretical research and research into applied topics. Based on market demands and market adjustments, they should organize those teachers who are good at dissemination of applications to take the initiative in developing short term, balanced, and quick projects. They can even adopt various formats of responsibility systems to attract teachers into taking up applied research, and directly serving social and economic development.

II. Earnestly aim at applications, be conscientious about substantial results.

Higher institutions ought to have intellectual reserves, and ought to have about 60 percent of their capacity engaged in the theoretical research of basic science, and based on the specialties of the school, can establish classes that focus on research, and within several years or a decade there will be breakthroughs to enter the ranks of international or domestic advanced levels. At the same time as this, about 40 percent of capacity should be put into actively taking the initiative to develop research into application topics, and to provide even more new products, new technologies, and new techniques for opening up the technology markets. This is also for accepting topics through various means that industrial departments encounter in actual production, that is, topics outside of planning. And, to constantly lead reserve knowledge or technology through horizontal relations to production departments, to feed technical difficulties from small to medium enterprises back to the schools, and to organize strength into making short term breakthroughs, allowing the potential of both parties to be fulfilled. When transferring the rights to technology, they should work toward perfecting one,

then transferring one, and should evaluate the maturity of any technology from the point of view of society, the market, and applications. Trade may be done through an intermediary, which causes the market to be even more dynamic.

III. Directions should be flexible, policies should be implemented.

It is recommended that we draw on the experience of privately run technology institutes and science and technology development companies regarding the flexible and expedient, yet sound methods to develop technology markets. They are not limited to a certain field or a certain discipline, but do whatever the market needs. They do not need a state allocation system, nor do they need state allocated expenses, for on the one hand they take on research topics that are needed by the market, and on the other, organize their scientific and technical capacities. When things have been sized up, they act, when projects are completed, they let them go. Scientists and technicians get paid according to their efforts, and profits are distributed according to the degree of technical advancement and the degree of difficulty, as well as the degree of contribution toward completion of the project. This kind of management method is similar to the way some higher institutions plan application research topics based on disciplines, but is also different. Where it is similar is that things are tailored to capabilities; where it is different is where one person can measure the cloth to fit the body, but another does not do it that way. As the technology market develops, application development must be social, comprehensive, and flexible, and must accelerate cross fertilization and permeation of disciplines, as many projects will transcend departments and disciplines, and even the scientists and technicians that are involved in a project will be from different units and different categories. For these reasons, the technology markets have posed new demands for science and technology management in the higher institutions. Science and technology management includes the determination of research directions and planning, and the implementation of corresponding policies and measures. For a long time now, technology has been rather backward in many production fields, and the capability for large scale production of inexpensive, high quality products has been low. When the reasons for this are discovered, it is found that it is because intellectual labor and its material value have not been acknowledged, and even less has it been taken onto the track of commercialization. The appearance of technology markets and the commercialization of technical achievements have brought convenience to the implementation of science and technology policies.

As awareness of science and technology markets deepens, as long as directions are flexible and policies are implemented, the function of higher institutions in the technology markets will go up another story.

12586
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HUBEI ACTING GOVERNOR ADDRESSES SCIENTIFIC EDUCATION MEETING

HK061137 Wuhan Hubei Provincial Service in Mandarin 1100 GMT 2 Mar 86

[Text] The provincial government held a meeting on the work of the scientific education front of the whole province in Wuchang from 22 to 26 February, stressing that governments at all levels should include all aspects of work of the scientific education front in the focal points of government work, strengthen leadership, and grasp it firmly and well.

In his summing-up speech, Guo Zhenqian, deputy secretary of the provincial CPC committee and acting governor, said: At present, the level of agricultural production in our province is not high, the quality of industrial products is poor, and benefits are not ideal. One of the very important problems is that our scientific and technological development and training of qualified personnel cannot catch up with the situation. Governments at all levels must further heighten understanding and really strengthen leadership over scientific and technological work.

He said: We must adhere to the orientation of gearing scientific and technological work to the needs of economic construction and of serving economic construction. Over the past few years, our province has scored some 1,000 items of important scientific and technological achievements but the majority of them have not been applied to production. This is a very big waste. If we seriously grasp well the popularization and application of the existing scientific and technological achievements and transform science and technology into productive forces as soon as possible, this will have very great potential. We must gradually establish a network of technological markets at many levels, through many channels, and in many forms to promote the transfer of scientific and technological achievements.

Guo Zhenqian pointed out: Governments at all levels must attach great importance to the development of intellectual resources, regard training qualified personnel as an important matter, and grasp it well. While guaranteeing the quality of the 9-year compulsory education system, we must develop vocational and technical education. Capital construction for the development of intellectual resources is the building of the ranks of teachers. These ranks must be expanded and their quality improved. In the future, except for the selection of leading cadres at and above the county level, no units are allowed to transfer teachers from middle and primary

schools. Those who have been transferred must be returned as soon as possible to the profession they were trained for.

In conclusion, Guo Zhenqian emphasized: The scientific education front and the work of all departments are important contents of building socialist spiritual civilization. Those who engage in building spiritual civilization must first grasp well the building of their own spiritual civilization, adhere to the four basic principles, and avoid and overcome all unhealthy trends.

Vice Governor Liang Shufen spoke at the beginning of the meeting.

/6091
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REFORMS IN DEFENSE INDUSTRY RESEARCH INSTITUTES

Beijing KEYAN GUANLI /SCIENCE RESEARCH MANAGEMENT/ in Chinese No 4, Oct 85 pp 25-27, 30

/Article by Liu Fohua /0491 0154 5478/, 29th Institute of the Ministry of Electronics Industry: "On Reforms in Defense Industry Research Institute's Organization-Management Structures"]

/Text/ "The Resolution of the Central Committee of the Chinese Communist Party on Reform of the Scientific and Technological System" pointed the direction for reform of the national defense scientific research system. Reforming the national defense scientific research system currently in force must accompany reform of the defense industry research institute organization management agencies, and this paper attempts to discuss several views on this question.

I. Establishment of Organization-Management Structures Should Be Favorable to Thorough Implementation of the Principle of "Guaranteeing Completion of National Defense Tasks and Shift Military Research Results to Civilian Use, and Establish a New Integrated Military-civilian System of Organization."

Although China's national defense scientific research system now in operation has gone through some adjustment, basically it was inherited as a package from the Soviet Union, there is a chasm between military and civilian scientific research under unalterable security regulations, policies and stipulations, the results of military scientific research cannot be rapidly and effectively converted to civilian use which to different degrees influences national economic construction and is not suited to the demands of the four modernizations. The "Resolution" clearly states: national defense scientific research organizations should set up a new system of military and civilian integration, and while guaranteeing the completion of national defense tasks, it should be geared to economic construction, accelerate converting the results of military technology to civilian use, and vigorously launch developmental research on commodities for civilian use. To set up this new system, when reforming the defense industry research institute organization management structure, separate military and civilian product technology management organizations (such as military products technology office and civilian products development office) should be set up under the responsible leadership of the director helped by the chief engineer. They are responsible respectively for military

and civilian product technology management, including formulation of long- and short-range technological development plans; determining the basic scientific research and applications research projects to be launched; are responsible for organizing appraisal of proposals for organizing research and trial manufacture projects and appraisal of technological key projects and scientific and technological results; are responsible for organizing solutions to technological problems which crop up in production projects, are responsible for authorized management of military and civilian product technological reports, technological market survey research and analysis to provide decision making materials to leadership in a timely fashion. The civilian products development office also should be responsible for converting the results of military technology to civilian use and for technological consultation service work abroad. To strengthen plan administration management, we should set up a plan administration office under the responsible leadership of the director helped by the deputy director of plan administration who is responsible to the director. The planning administration office is responsible for authorized administration of military and civilian product research, trial manufacture and production planning, is responsible for authorized administration of technological administrative planning, commodity sales, and economic benefits planning, is responsible for compensated contracts and various administrative contracts, and signing of sales contracts, is responsible for coordination, balance and implementation of project plans. Research institutes with the necessary conditions may also start up, as appropriate, military and civilian products research laboratories and trial manufacture production shops so as to be able to concentrate their energies on the work at hand and resolving contradictions encountered in the process of military and civilian product plan implementation.

Plan administration management and military and civilian product technology management are two very important aspects of scientific research management work and under the unified leadership of the director dividing the managerial labor among the three above-mentioned departments each with its own tasks and responsibilities is favorable for opening channels of communication for plan administration and technological direction management, is favorable for being more thorough and improving management work, and is favorable for improving work efficiency.

II. Establishing of Organization-Management Structures Should be Favorable to "Changing Track and Changing Form," Developing From Pure Scientific Research to Scientific Research Administration

Although there have been many advances and improvements in financial management in defense industry research institutes in recent years, such as implementing control of administrative management expenses, and some have also carried out cost accounting work. However, because in the past what was implemented was a system for supply of scientific research enterprise administrative expenses and did not concentrate on control and management of scientific trial-manufacture costs and management expenses, there were neither working organizations nor a set of measures and methods, not to mention a lack of managerial talent in this area. Up to the present, the overwhelming of financial departments settle accounts according to the amount of the ultimate expenditures. Thus, in the process of research and trial-manufacture, without

computing costs, such phenomena as extravagance are rather serious, and the idea of economy is lacking among engineering and technological personnel. If this situation is not overcome, it will be very difficult to adapt to the demands of reform of the scientific and technological system, because the "Resolution" stated: for important scientific and technological research which is part of central and local planning, planning management also should utilize economic levers, observe the law of value, and gradually carry out on a trial basis management methods oriented towards open bidding and signing of responsibility contracts. It is very clear that a research institute whose management level is low, consumption is large, and cost expenditures are high is one which cannot win in open bidding. If by chance one wins the bid, one is also forced to adopt measures to lower expenditures and reduce costs. In view of the above factors, it is very necessary that an accountant be assigned to the research institute to implement an accounting system. He helps the director stress cost control of scientific research trial manufacture. At the same time, a specialized agency should be created in the finance department and an economic accounting network suited to the research institute should be established to take care of routine work. It should stress effectiveness with such relevant departments as plan administrative management, technological management, quality control and goods and materials management to facilitate the rapid conversion from pure scientific research to scientific research management (or scientific research production).

III. Organizational and Management Structures Should Be Simple, Unified, Efficient

For this, it is necessary to do the following:

First, similar organizations should be unified, similar tasks should be classified, similar procedures should be combined, organizations which should be shut down, resolutely shut down, those which may or may not be established should uniformly not be established. We should work hard to simplify organizations and keep the personnel small in number. For example, after implementing the director responsibility system, middle level cadres below assistant director in scientific and technological and administrative areas are appointed or engaged by the director and after the management of these cadres has been separated from the party committee office, they can be combined with the worker personnel department under unified management and no cadre office need be created. To stress in a unified way the training and employment of personnel, technological education also should be combined with the worker department and called worker and education office.

Second, there should be systematic and clear decisionmaking and management levels and responsibility. The decisionmaking level is headed by the director, with the participation of the deputy director, chief engineer and chief accountant, and when necessary leaders from relevant departments can be called on to participate in meetings to ensure timely decisionmaking and not miss a timely opportunity. The management level is made up of the leaders of the function management organizations to ensure the execution of the leadership decisionmaking.

Third, organizations must be in matrix form. With the help of the deputy director, chief engineer and chief accountant, the director carries out vertical leadership of the function management departments, with each attending to its own duties, bearing its own responsibilities strengthening horizontal coordination, to guard against intersecting leadership and command, otherwise there will be chaos.

Fourth, improve the quality of management personnel and the combination of vocational work and intellectual ability of management personnel should be rational. The closed style of defense industry research institutes of the past is now oriented towards society and towards economic construction, launching technological administration and development of civilian commodities is bound to encounter many new situations and problems in management work, and this requires a group of able and efficient management personnel. Thus, improving the quality of management personnel, reducing administrative personnel, and cooorespondingly increasing the special management personnel (such as technological administration and distribution personnel, management personnel of reliable quality, accountants, economists) reforming the combination of vocational work and intellectual ability of management personnel is an important task facing research institutes. To resolve this aspect of management personnel, one, ask the nation for allocations; two, carry out our own program of selecting candidates to be send for advanced training; three, train candidates in actual work and encourage them to pursue self-study.

Fifth, we should improve the position and treatment of management personnel, especially those who do well in management work. We should reward people according to merit and give important rewards for important contributions so that they will keep their minds on management work. The key here is that we should improve the understanding of the leadership about the importance of management.

On the basis of the above demands, we propose a reference scheme for establishing local (divisional) level 1,000-2,000 man defense industry research institute organizations, see table for details.

IV. Establishment of Organization Organizations Should Be Beneficial to Strengthening Democratic Management

The broad engineering technological personnel and workers are the main body of the research institute employees, they are the masters of the research institute, while the director is a leader and public servant. After implementation of the director responsibility system, whether or not he can maintain and strengthen democratic management involved the direction of research institute reform and is related to the problem of whether or not he can implement the "Resolution." Employee representative assemblies in enterprises are an important form for strengthening democratic enterprise management. This writer believes that although the research institute has a mass-type academic organization--the technological committee--which is an organizational form for developing technological democracy, it cannot take the place of the role of the worker union and employee representative assembly, thus this worker union should be established and the employee representative assembly system

implemented. The research institute is a place where intellectuals are concentrated, and in the past under "leftist" thinking, workers and intellectuals were thought to be worlds apart: the former had been educated, the latter had received re-education. But now the intellectuals are part of the worker class and it is absolutely necessary for research institutes to create worker unions and carry out a system of employee representative assemblies. Its necessity and importance are outlined below:

First, legislation. According to relevant stipulations from the state and upper echelons, through broad discussion, approval and formulation of the research institute laws and regulations and relevant rules (also called the fundamental law of the research institute) by employee representative assemblies, it is published and carried out by order of the director so that the research institute gradually moves towards a legal system. With the passage of time and changes in the situation, when it is necessary to revise and supplement it, it is again discussed by the employee representative assembly and this task is carried out. In this fashion, the democratic rights of the employees can be enforced, they can be masters of their own house, increase their sense of responsibility as masters, and give full play to the wisdom of the masses and it also can ensure the continuity of the research institute laws and regulations which is beneficial for thorough execution.

Second, organization mobilizes the employee masses to carry out the tasks. At fixed intervals the director gives a work report to the employees representative assembly, puts forth tasks and demands, mobilizes and appeals to the entire body of employees to make suggestions, and strives to realize the struggle goals of the institute. Some major problems can also be turned over to the employee representative assembly for discussion and investigation to reduce or avoid errors in major problems. For example, in the major question currently of the overall proposal for reform of the research institute system, if the reform draft is turned over to the representative assembly for discussion, it can both pool the wisdom of the masses and add to the improvement of the revision as well as lay a ideological foundation and mass foundation for reform which will be beneficial for promoting reform.

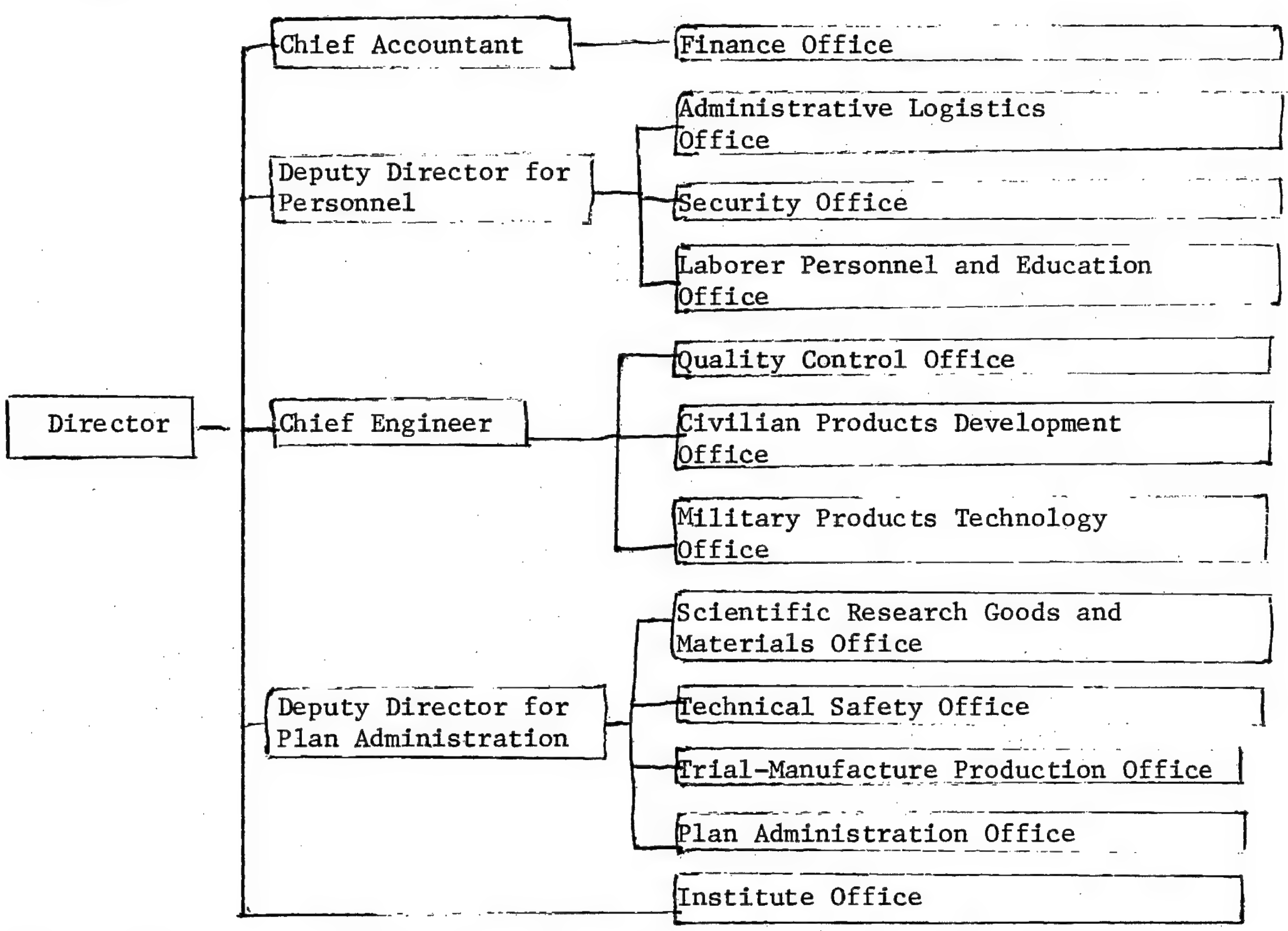
Third, democratic evaluation of leadership cadres at various levels at set intervals. The worker union or employee representative assembly should have the right to propose commendation and rewards for cadres and have the right to propose recall of cadres who are unqualified or commit serious errors, and to receive and approval petitions in accord with the jurisdiction to appoint and remove cadres. The above actions will place cadres at all levels under the supervision of the employee masses, which is favorable for correcting incorrect work styles and ensures the thorough implementation of the party's line, principles and policies.

Fourth, democratic election of the director. The research institute implements the director responsibility system and the director is appointed or engaged by the upper echelons. The following procedures may be adopted for the appointment of the director. Before appointment or engagement, upper echelon organs send someone to the institute to attend the employee representative assembly. At the assembly, candidates for director give a campaign speech (including the

struggle goals they would like to achieve after their election within a certain period and the measures and methods to be used to achieve these goals), then the representatives participate in a secret ballot and the person receiving the greatest number of votes is elected and immediately a military order is issued requesting upper echelons to investigate the appointment, then the director appointed forms his cabinet. This is also a good method which should be used on a trial basis in the reform of the cadre system. It is beneficial for discovering talented persons and promoting worthy and capable people.

Fifth, safeguarding the lawful rights and interests of the employees is not violated. Worker unions are the research institute's employee mass organizations, the employees' family. If the lawful rights and interests of the employees are violated, the worker union can be asked for help in resolving it, and the worker union has the responsibility to come out boldly; safeguarding the lawful rights and interests of the employee masses is done through normal lawful means.

Sixth, helping the director deal with relevant matters. For example, employee housing assignment, civil disputes between employees, disputes within employee's families, serving as go-between or intermediary in the marriages of men and women, etc. They both can make the employee feel some concern for the organization and mobilize the initiative of the masses as well as free the director from some daily trivial matters.



(Note: there are no further departments below office level to reduce levels)

Factories and enterprises generally form worker unions and have a wealth of work experience which can play an important role in enterprise construction and development. For a healthy research institute leadership management system, worker unions should also be established and the employee representative assembly system implemented. Under the concern of the institute party committee, to strengthen worker union construction, to study hard the work experience of enterprise worker unions, to combine it with the characteristic features of the research institute and to do a good job is very significant. This is a fundamental construction task for research institutes.

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NATIONAL DEVELOPMENTS

OPEN DOOR POLICY FOR S&T INSTITUTES SUCCESSFUL

Beijing RENMIN RIBAO in Chinese 27 Jan 86 p 1

[Report by Ren Xinfa [0117 2946 4099] and Wang Yougong [3769 0645 1872]: "A Number of Research Institutes and Laboratories Affiliated with the Chinese Academy of Sciences Open to the Outside"]

[Text] Since 2 research institutes and 17 research laboratories affiliated with the Chinese Academy of Sciences opened to the outside beginning in August 1985, they have been warmly welcomed by both domestic and foreign scientists. Some famous scientists have praised the far ranging effect of this restructuring on the scientific mission and production in China.

In the process of implementing the resolution by the Central Committee regarding restructuring of the science and technology system, and in order to strengthen academic exchanges with colleges and universities and production sectors, the Chinese Academy of Sciences first selected the Institutes of Theoretical Physics and Mathematics because their equipment situations were rather good and their scholastic standards high, and opened them to the outside together with 17 research laboratories like the Structural Chemistry Laboratory of the Structure of Matter Research Institute in Fuzhou. These institutes and laboratories hired leading scholars from both within and outside the Academy; science workers who needed to come here to work had to first propose their topics in applications, and all those who have been passed by scholastic committees in the institutes and laboratories could be visiting researchers engaged in research and would be subsidized by the Science Fund. Now, there are already 113 scientists from outside the Academy and 17 foreign scientists engaged as directors or scholastic committee chairmen or committee members at these open institutes and laboratories. As of now, these institutes and laboratories have already received more than 600 applications and reports, and more than 360 topics have been approved by specialists, and there will be more than 600 scientists from outside the Academy who will come here one after the other to work, as well as more than 30 foreign scholars who will come for joint research.

Scientists have realized that this restructuring measure by the Chinese Academy of Sciences breaks up the barriers between sectors, and that it connects science work throughout the country and accelerates the opening of new channels for scholastic exchange and cooperation both domestic and

foreign; the equipment and conditions for experiment at these institutes and laboratories have been unreservedly opened to science workers throughout the country so that to some degree they may avoid duplicate investment in research expenses, and that it will be beneficial in gathering outstanding talent to develop cooperative research; these units have given priority to opening to young scientists, which can speed up the training of high level science talent. Aside from this, scientists have also realized that this will also be beneficial to the cross influencing of different disciplines, which is of use to the development of rising new disciplines.

To better manage the institutes and laboratories that have been opened, the Chinese Academy of Sciences plans to establish complete management methods for research institutes and laboratories based on a summation of experiences from the first stage. To ensure the openness and mobility of these institutes and laboratories, they plan to better control fixed authorized complements, expand the numbers of visiting personnel, and plan to further expand the numbers of institutes and laboratories that are open to the outside. They will also hire laboratory and institute directors from throughout the nation.

12586
CSO: 4008/2067

NATIONAL DEVELOPMENTS

SURVEY OF SCIENCE RESEARCH INSTITUTES RELEASED

OW111158 Beijing XINHUA in English 1146 GMT 11 Mar 86

[Text] Beijing, March 11 (XINHUA)--Nearly all of China's 4,935 science and technology institutes were engaged in research for civilian purposes at the end of last year, according to a census released today.

Results of the survey, the first of its kind since the founding of new China in 1949, were announced by an official of the National Science and Technology Census.

The census began in November and was completed with the help of 30,000 people. Census workers found that more than 770,000 people work in the 4,690 civilian institutes, including 231,000 scientists and engineers and 121,000 technicians.

Last year the institutes earned 780 million yuan by developing technology for enterprises.

According to the census, China's 760 colleges and universities of science and engineering, agricultural and medical sciences have a technical force of 481,088 people, including 356,088 scientists and engineers.

The colleges and universities signed 7,077 contracts involving 126.4 million yuan with enterprises for technology development last year.

According to the census official, the census will help China to "modernize scientific management and provide the scientific information for making decisions on economic reforms."

The statistical standards used in the census, the official said, are equivalent to those of UNESCO.

Further reports are expected on China's scientific activities, research findings and research expenses based on the census data, the official said.

/6091
CSO: 4010/2011

NATIONAL DEVELOPMENTS

CRITICISMS OF S&T SITUATION IN HIGHER INSTITUTIONS

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF S&T] in Chinese No 11, 15 Nov 85 pp 33-35

[Article by Tao Xinliang [7118 9515 5328], Office of Science Research, Shanghai Industrial College: "Some Viewpoints on Science and Technology Development in Higher Institutions"]

[Text] I.

Higher institutions rely upon the comprehensive technical advantages of their full and complete curriculum; they rely upon the comprehensive advantages of having many teachers, graduate students, and undergraduates; they rely upon the comprehensive information advantages from their vantage point among developments in technology and as a site for the collection and dissemination of science information; they rely upon the comprehensive development advantages from both science and technology service and talent in cultivation. With intellectual investment as the primary form, with technical output and talent cultivation as the primary means, they have become a major force in the cause of science and technology development, and have become a very vigorous and important power in the technology markets. But as the markets have abruptly risen and quickly developed, scientific and technical development in the higher institutions has both had its own advantages and characteristics, and its new problems.

1. They are faced with a fierce and unprecedented competition.

The forceful opening of the technology markets is manifest in the daily bustle of both buyers and sellers. On the one hand, with the abrupt rise of township and town enterprises, the rapid development of small to medium factories, and the great advances in economic construction, the requirements of scientific and technical achievements were expanded, and buying capacity and potential for technology by buyers increased. On the other hand, there were also great changes in the conditions of the sellers. Currently, the main powers actively putting technical achievements out on the technology markets are not just the science research organizations and the higher institutions; there are also various hierarchical science and technology development companies and centers that are horizontally aligned and non-governmental. And there are science association systems and systems of trade unions and technical associations,

and some medium to large, and even small, factories have been setting up their own technology development departments or third production structures, all of which have joined the ranks of sellers in the technology markets. Industrial and mining enterprises have relied upon their own mature production technologies and abundant economic capacities, and through the channels of joint operations of production, technology output, sending out the processing of components, and providing materials and markets, they have become more vital in the technology markets; science associations and technology associations use the advantages of their talent networks and generous economic remuneration to attract a number of technicians to engage in science and technology development; private science and technology development companies even more rely upon their flexible operations and adaptable economic means to make the most of the potential in technical talent from everywhere in society, including the higher institutions. With so many forces out there, science and technology development in the higher institutions is faced with a precipitous battle line and very fierce competition.

2. There is an unfortunate tendency for an outflow of intellect.

Science research and development at higher level institutions has in recent years been struck in succession by three great influences due to the fact that the economic treatment of teachers is uneven. These have been jokingly called "the three waves." First: the gap in economic remuneration between science and technology development projects and projects from planning has grown steadily wider, the former because of deductions in net income, as well as because the proportion of the deductions has continued to rise (for example, at this school it has gone from 4 percent to 10 percent, and then to 17 percent), and the latter because they have not charged a single cent, and although some schools have adopted methods to "supplement internal deficiencies with outside help," these have been totally inadequate measures. The gap between the respective economic treatments of these two things has reached the point where some teachers have begun to "treat internal planning lightly, while emphasizing external planning." This has weakened the reasonable structures in science research in the schools, as well as the technical reserves for science and technology development. The second "wave": the majority of teachers are members of learned societies affiliated with science associations at all levels, and some years ago the science association system raised the portion of economic income from science and technology development received by individuals to 30 percent, and some have covertly tried to make it even greater. The tendency for some teachers to "emphasize science associations and neglect teaching" has caused a number of science and technology development projects that could have been taken on by schools to be shifted to science and technology associations at various levels, with the result that although the schools produce intellectual and material resources, the science associations obtain the material benefit and success. The third "wave": an upsurge in having work in addition to one's job, which some have called "the second occupation." Higher institutions used to have strict limitations on the question of teachers having concurrent work, as for example where it was ruled that sparetime part-time jobs had to be approved by the unit, and a proportion of the income obtained thereby was taken by the unit to take care of neighbors, etc. The "Resolution Concerning Restructuring of the Science and Technology System" once again pointed out that "with the

prerequisite that scientists and technicians complete their own work and not infringe on the technical rights and economic benefits of their unit, they may engage in technical work and consulting services in their spare time, the income from which will go to themselves; if the technical achievements and internal technical materials and equipment of the unit are used, that unit must agree to said use, and a portion of the income turned over to the unit." Macroscopically, this measure is undoubtedly beneficial to developing the enthusiasm of scientists and technicians, and to accelerating advances in science and technology and in the development of economic construction. But from the school's view of microscopic management, this will be difficult to get a precise hold on. Teachers do not have a strict schedule, and they cannot, as can industrial and mining enterprises and research organizations, put a clear boundary around 8 hours. Intellect and knowledge is a formless valuable product residing within the minds of teachers, and it would be very difficult to simply put on clear marks like "this belongs to the unit" and "this belongs to the individual," much less where there is no clear provision that sparetime part-time work be put on the unit's records. Therefore, the schools find it difficult to know and determine whether the individual has violated the technical rights and economic benefit of the unit, so how is it to know whether internal technical materials have been disclosed? Schools cannot understand this. This has led to the tendency where some teachers have "emphasized the part-time job, while neglecting their own."

"Emphasizing external planning over the internal"; "emphasizing science associations over the schools"; emphasizing the part-time job over the primary one," these three "waves" have resulted in a considerable portion of the intellect of schools being drained away.

3. There has not been a respect in fact corresponding to that in name.

Higher institutions are called one of the fifth route armies, but in fact have not received a sufficient amount of respect corresponding to that. It is, on the one hand, not like Chinese Academy of Sciences and local science academies, which can be supported by leading departments of all levels; nor is it like with research organizations in departments of the industrial and communications industries, that are supported by economics commissions, and in catering to factories have abundant financial resources for backup. When relevant leaders are dealing with large research development projects, what they think of first are the science academy system and affiliated research organizations; local industrial departments always think first that "rich waters should not flow to the houses of others," and confine their efforts to localities, taking care of research or development organizations run by the organization itself. It is always the case that only ungnawable hard bones and inedible chicken ribs and tails are turned over to the higher institutions.

Also, when some industrial departments import foreign advanced technology and equipment, they invariably neglect the high level capacity for assimilation and absorption possessed by higher institutions and science research organizations, and if they do not cast higher institutions to one side, they put them into secondary positions; higher institutions must cater to economic construction, but cannot "squeeze" into the higher echelons of scientific and

technical development circles, into which advanced technology is absorbed and imported. They can only frustratingly chase after what is left, and cater to township and town enterprises with greater effort and take up work in the lower levels of science and technology development. If this goes on for a long time, it could create the following consequences: on the one hand, industrial departments will have lost the support of the scientific and technical capabilities of higher institutions, dragging down the process of absorbing imported technology and affecting the results from that absorption, even to the extent that they cannot give full play to the function of foreign advanced technology and equipment; sometimes, there is inappropriate repeated importation, which increases the expenditure of foreign exchange. On the other hand, higher institutions have therefore lost out on a valuable means of making contact with international advanced technology, and the level of science research cannot take advantage of an even greater boost, and sometimes it even happens that science research at higher institutions falls behind that of the level of technology already imported.

II.

How can we maintain and strengthen the capability for distillation of science and technology research at higher institutions?

1. Maintain the appropriate proportion of science and technology development funds, and increase encouragement economically. For the individual, there are four choices placed before the teachers at higher institutions: A. carry on in the capacity of the school, and when finished with a project, 14-17 percent of the net income should be deducted according to the particular provisions of each school as individual remuneration. B. Attach oneself to science associations, and deduct individual remunerations from 30 percent of net income according to science association provisions. C. Through the channels of private development companies, after completion, it is only necessary that they take 20-40 percent for management expenses, and the rest of the net income can be returned to individuals. D. Take on a spare time job directly with township and town enterprises or group units, the net income from which would nearly all go to the individual, or, as an alternative, he would receive a concurrent wage of the same amount. Among the four choices above, the deductions for the school itself are the least amount, but higher institutions still have the economic levers of increasing wages and promotions to maintain their momentum, attraction, and their distillation capacity. The proportion of money given to participants in technology development at higher institutions ought to be raised, or otherwise there will be a further increase in alienation, which would increase the tendency for intellect at higher institutions to flow away.

2. Provide for necessary procedures for managing concurrent jobs, and be more restrictive in discipline.

Seeing that teachers at higher institutions have no real 8-hour limitation, and that even including the quality of teaching and the amount of work done in research is a method that still lacks perfection and accuracy, therefore, when concurrent jobs are not approved by the units it can result in a few teachers "being on the job but their minds are elsewhere," a situation that cannot be

controlled. It is recommended that provisions be made that sparetime part-time jobs by teachers at higher institutions be subject to approval by their units to more easily maintain the capacity for distillation of the science and technology development in higher institutions, and to reduce the outflow of intellect.

3. Enhance the self-building of higher institution science and technology development operations contingents.

Self-building of higher institution science and technology development operations contingents include two items. One is the improvement of the quality of the entire structure; the second is to arouse the enthusiasm of operations personnel.

Aside from deducting a certain percentage of economic income to encourage operations personnel in science and technology development, the prompt resolution of posts (academic rank) problems for operations personnel in science and technology development is an important measure for arousing the enthusiasm of those operations personnel. Operations personnel in science and technology development are just like people in research management and instruction management in that they are all professionals. Since we admit that management science is a large science, then why does management not share corresponding posts (academic rank)? We must change the erroneous conception that looks down on operations. Evaluation of the posts of specialized management workers ought to have different standards, should form a series of their own, ought to be based on the characteristics of specialist management workers themselves, and should be formulated as quickly as possible according to the relevant standards of other position series. This is also a necessary condition for science and technology development to have connections outside itself.

4. Coordinate well the science and technology research organizations of higher institutions with science research management organizations.

The original science research management organizations in higher institutions are an office level organizational system--the office of science research. In recent years, there have been two types of science and technology development organizations that have emerged, one being the earlier science and technology service department (science and technology development department), and the other kind is the recent science and technology development company. But the science and technology service department is subordinate to the office of science research, in other words, two names for just one group. We believe that: 1. there is a great deal of science and technology, procedures are complicated, and responsibilities are great. Therefore, structures should not be too small, and for the allotment of personnel there should be guarantees for a certain number of them and their quality. 2. Science and technology development companies and science and technology service departments are best managed together, for if the two are separate it will not be conducive to the overall planning of the school science and technology development, nor for overall arrangements. 3. Science research and science and technology development are two important links tightly forged together in a chain. Their relations must be strengthened, organically integrated, and they must never be severed.

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NATIONAL DEVELOPMENTS

SUGGESTIONS FOR REFORM OF COLLEGE S&T RESEARCH

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENTIOLOGY AND MANAGEMENT OF S&T] in Chinese No 11, 15 Nov 85 pp 32-36

[Article by Shuai Xiangzhi [1596 4161 1807], Office of Science Research, Shandong Shifan University: "Science in the Higher Institutions Is in Urgent Need of Reform"]

[Text] China's economic, science and technology [S&T], and education systems are currently faced with a new trend toward full-scale restructuring, and restructuring of the science and technology systems at higher institutions is also gradually developing. These reforms are of great significance to building China's four modernizations. Reforming scientific research at higher institutions is also an important aspect of this.

I. Reforming Science Research at Higher Institutions Will Suit New Trends in Economic Development

Since the founding of our nation, our higher institutions, and especially those affiliated with major academies, have made important contributions to economic and cultural construction, and some of the research achievements they have made have already been applied in actual production, and, what is more, have gained important economic and social results. However, because they have long been affected by "leftist" influences, the phenomenon in which the science research at higher institutions has been divorced from production has been all too serious. Just looking at the 1984 statistics from two major comprehensive colleges in Shandong alone, we can see that there was no direct relation between 60-70 percent of science research projects and production. Science research at higher institutions, and especially in applications and development research, has not received the attention it should have.

The CPC Central Committee pointed out long ago that "Higher institutions are both centers for education and are centers for science research, and they are am important front army for science research." The "two centers" points mainly to the social function of higher institutions, that is, the position and function of higher institutions in building toward modernization. To see the "two centers" as dealing with only teaching and research in higher institutions would be incomplete.

Currently, if science research at higher institutions is to concentrate on applications and development, then it must take as the goal of its topic selection the promotion of technical advancement, technical transformation, and the renewal and updating of products in industrial and mining enterprises, as well as importing, absorption, and assimilation. By joining higher institutions with factory and mining enterprises, we can make use of the methods of voluntary participation and mutual benefit and multiple formats: 1. to accept commissions from industry and factories through the channels of the technology markets and science and technology trade fairs, sign contracts for specialist projects, help research new products and new techniques, or by representing the development and provision of key equipment; 2. cooperatively undertake technical troubleshooting. Science and technology is a strongpoint of schools, and manufacturing and technique are the strongpoints of factory and mining enterprises. If the two cooperate, they can reduce research times and hasten the transformation of achievements into direct production forces; 3. establish joint research and production groups. With the schools taking on research, design, and experimentation, the factories can do processing and trial production, as well as provide a certain amount of research expenses to the schools. After the achievements have been appraised and are in batch production by the factories, the schools would deduct a percentage from the amount of annual sales (or annual profits). Working this way, we can quicken the research pace of schools, accelerate the transfer of achievements, and increase income; factories can also renew their products, improve their capacity for competition, and greatly increase their profits.

II. Implement a Research Topic Contract Responsibility System, Improve Benefits from Investment

By implementing a research topic contract responsibility system, we would organically combine the benefits for the state, units, and individuals with the responsibility, authority, and benefits of the research group and individuals. This would be beneficial to arousing the enthusiasm of the majority of teachers, would improve work efficiency and investment results, and would be a good method worth trying. But schools are not the same as factories and agricultural and specialist research institutes, so a research topic contract responsibility system cannot be implemented in one fell swoop. We must consider the characteristics of schools and the nature and source of responsibility for research topics, and adopt a corresponding research topic or responsibility contract system.

The most important sources of research topics for higher institutions include: directive planning by the National Science Commission, ministries in the State Council, regional science commissions, and relevant provincial departments, National Science Fund topics, and contractual commissions by factory and mining enterprises. In carrying out topic planning, because topic responsibility is clear for factory commissions, division of labor is specific, and rewards and punishment clear, tasking completion is somewhat better. But projects that are included in the planning of the state and regional science commissions are often not completed on time. Some schools favor seeking out directive research topics for the economic income to the particular unit. They have not given sufficient attention to planning arrangements, selection of personnel, and scientific and technical conditions,

and to the necessary guarantees. On the contrary, they concentrate all their resources on those "immediately beneficial" topics that will increase income. The result of all this is that although they can provide new products and new techniques for factory and mining enterprises, as well as allow the researchers themselves to have more economic income, and teachers can obtain more reward money, this all adversely affects the completion of national science research planning. According to statistics, 16 higher institutions in Shandong ought to have completed 25 provincial science commission planning projects, but actually only finished 8, or 32 percent.

Everyone knows that nationally funded science research planning is determined by overall planning of the national economy, and is tasking that is concerned with the whole. If this kind of tasking is not completed, this will lead to national and social losses in technology, and sometimes these losses are extremely serious. Therefore, any unit implementing any kind of responsibility system must first assume national science tasking, and ensure that it is completed on time, with sufficient quality, and in sufficient quantity.

Based on the differing natures and sources of the topics that higher institutions take up, for directive planning an enforced planning responsibility contract system may be implemented; for projects commissioned by factories, a topic contract responsibility system may be used. But no matter what the form of the responsibility system, the responsibilities must be made clear, the times for completion and qualities should be clarified, and the rewards and punishments made clear. When topic tasking has been completed, research units and individuals may both receive a certain economic income.

If directive scientific research topics implement an enforced planning responsibility contract system, it can be done so that the school (office of scientific research) signs enforced planning contract documents with each department or institute. The contents of that contract would include: the research subjects, technical requirements, progress arrangements, personnel participating, required conditions (expenses, materials, instruments and equipment, and experimentation sites), and methods for reward and punishment. After the contracts have been signed, the topic group will formulate particular working plans, will place certain responsibilities on people, and will guarantee the on-time completion of the planned tasks. Based on the contract requirements, the school should allocate funds and materials promptly to the topic group. For that research tasking that is completed on time, and also that has outstanding economic or social benefits, or is at a higher academic standard, the topic group and individuals should be rewarded appropriately in accordance with award clauses. Award funds may be taken from a proportion of the research expenses for that project. For those projects not completed according to plan, and where there is no objective reason, this should be taken as the responsibility of those in the unit in charge and of the topic responsible persons, or a portion of the research expenses should be taken back, and they cannot apply for new projects for a certain time.

For topics that are commissions from factory and mining enterprises and that have been obtained through the channels of technology markets and science and

technology trade fairs, responsibility contracts can be signed between the departments or institutes and the topic group or research laboratory. The contents of the contracts can be according to the needs of the factories, but should include clarification of responsibility, the division of labor, and punishments and rewards. We want to be responsible to society, and want to allow the achievements of research to truly produce economic results and to be worth the practical experience. To improve the returns on investment, schools should use project research funds or development funds that have been arranged within the school, or they can also implement bidding for topics and contracts for compensated usage.

III. Expand the Autonomy of Research Institutes and Laboratories

The phenomenon in higher institutions of "too secure, with stifling control" has been quite serious. When research units at higher level institutions have no authority over personnel or financial affairs, and there is a lack of vitality in economic construction, this sort of situation impedes the development of personnel intellect and creative abilities, nor is it a benefit to producing either achievements or talent. The author believes that reform should be undertaken in the following aspects:

1. There should be a certain amount of authority over personnel by research organizations. Research institutes would implement institute director responsibility systems, where institute directors have the authority to decide on facilities for organizations within the institute, and the authority to appoint or dismiss cadre. The deputy director can act in the name of the director, reporting to departments at higher levels for approval of appointments.

Within the research institute there should be freedom of organization for the topic groups, and there should also be gradual implementation of an employment system. The hiring system would chiefly operate within the institute, but based on the needs of the work, the institute could also go outside the institute to hire scientists, technicians, and technical workers, and can as well recruit graduate students and college students to participate in the research. As for those who are unemployed or are being sent away from the institute, there is the authority to make other arrangements and to aid in separation.

2. Research units would have the authority to use funds. We would change the troublesome method of the past in which spending even 1 yuan required signatures from the lab, the department (institute), and school. Use of science research funds can be done with three level control, namely, the school, the department (institute), and the lab or topic group. Anything at 2,000 yuan and below can be approved by responsible persons in the lab or by those responsible in the topic group; 5,000 and below can be approved by department (institute) the respective persons of responsibility; 10,000 and below can be approved by the office of science research (outlays above 10,000 yuan must be submitted to the responsible institute director). Science research development funds earned by the research institute may be arranged in general by the institute director for use primarily in laboratory construction and in arranging projects selected by the institute itself.

3. Science research organizations should have the vitality to cater to economic construction and the needs of society. Under the premise of ensuring completion of assigned science research tasking, we should permit departments (institutes) to integrate the research directions of a unit, fully using their own technical capabilities and conditions. On a contractual basis, commission other units for the tasks of research, experimentation, trial production, and technical processing. Also, on the basis of the compensated transfer of rights to technical achievements, sell small and medium trial products and develop technical servicing for the outside to generate economic income. Specialist research institutes should operate science research production models, both for study and for batch production, to gradually reduce the service fees that are provided by the state.

4. Those responsible for research institutes and laboratories should have the authority for rewards and punishment. Those responsible for research institutes and laboratories should establish a certain awards fund to reward outstanding accomplishments in research and in dissemination of achievements, to reward the greater contributions to economic construction and to society, and to reward scholastic innovations, and greater rewards for the most outstanding. Also, in the aspects of housing and living amenities, these accomplishments should be reported to relevant departments for appropriate consideration. There should be economic punishment for those who do not abide by distribution, and for those who cannot complete research tasking when there is no objective reason.

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BRIEFS

ELECTRONICS PLANTS TRANSFERRED--Twenty five Shaanxi enterprises and units of the Ministry of Electronics Industry have been transferred to the jurisdiction of local authorities in the province. Leaders of the ministry and the provincial government held a takeover ceremony in Xian on 12 March. The units include the nos. 607, 702, 704, and 709 plants. They are being transferred to local jurisdiction in the province with effect from 1 February this year. The provincial government has decided that the Huang He Machine-Building Plant and the Hognhua Instruments and Meters Plant will be placed directly under Xian City. The other 23 units will be managed by the Provincial Electronics Industry Department for the time being. After a time, when conditions are ripe, they will be handed over to the jurisdiction of the towns where they are located. The Ministry of Electronics Industry and the provincial government have also agreed on specific views regarding the operational management and profit payment of these enterprises following their transfer. The ministry will provide macro guidance for the enterprises and develop them in a coordinated way. The Provincial Electronics Industry Department will continue to grasp reform, promote joint operations, and create conditions for transferring the enterprises to the jurisdiction of the cities where they are located. [Excerpts] [Xian Shaanxi Provincial Service in Mandarin 2300 GMT 12 Mar 86 HK] /12913

JAPANESE COMPUTER JOINT VENTURE--The Tianjin Economic and Technological Development Zone General Company and the (Kexi) Company Ltd. of Japan have decided to jointly finance and operate the Tianjin (Kexi) Company Ltd. The contract signing ceremony was held in Tianjin today. This jointly-financed enterprise will produce and develop computer peripheral equipment, computer accessary products, and plasma cutting and welding devices. A large part of the products will be exported to foreign countries, and the remainder will be supplied to meet domestic demands. Thanks to the rather perfect conditions for making investment and building plants in the development zone, this company will go into production within this year. [Text] [Tianjin City Service in Mandarin 1430 GMT 16 Jan 86 SK] /12913

JIANGSU COMPUTER APPLICATION--More computers are now being used in Jaingsu. The province boasts 4,700 computers, a twelvefold increase over 1983. The area of application of computers is also expanding. Now, computers are used in 1,500 fields, 10 times 1983. [Summary] [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 20 Jan 86 OW] /12913

CONTROLLING ELECTRONICS IMPORTS--Li Peng, vice premier of the State Council recently: Beginning this year, China will carry out an appropriate protectionist policy on microcomputers and electronic parts produced by its electronics industry. Requirements for these items should be met mainly by domestic supplies if they can be produced in our country and if the quality of domestic products can satisfy needs. China has begun mass production of 8- and 16-bit microcomputers. Production of electronic parts has also attained a certain level. Therefore, in the days to come, if an item can be produced domestically and if the quality of the domestic product can be guaranteed, we should rely on domestic supplies and exercise appropriate control over imports. [Text] [Beijing in Mandarin to Taiwan 1500 GMT 27 Jan 86 OW] /12913

JIANGSU ELECTRONICS INDUSTRY--Jiangsu's Electronics Industry made much headway during the Sixth 5-Year Plan. The total output value in 1985 reached 5,135 million yuan, triple the record registered in 1980. The average annual growth rate of output value was 24.64 percent. In 1985 the industry contributed 817 million yuan to the state through the delivery of profits and payment of tax. This is 250 percent more than the contributions made in 1980. During this 5-year period, the industry completed 116 technological upgrading projects, including those using foreign technologies. Relatively big production capacities were established for such products as integrated circuits, computers, color TV sets, and radio cassette players. The quality of many products attained the international level for the 1970's and early 1980's [Summary] [Nanjing Jiangsu Provincial Service in Mandarin 1100 GMT 22 Feb 86 OW] /12913

NUMBER OF SCIENCE INSTITUTIONS--A recent national survey, the first of its kind in China, counted 4,935 institutions engaged in scientific research and technological development. In a press conference yesterday, an official from the State Science and Technology Commission said the national survey was aimed at determining the overall situation of science and technology in China. The survey, which began last November, involved 30,000 people. The official said it would help reform management methods in research institutes and technological development organizations. The survey found 770,000 people working in such institutes and organizations. Thirty per cent were scientists and engineers. Technicians made up 15 per cent of the total. According to the survey, China now has 760 colleges and universities involved in science, engineering, agriculture and medicine, with a combined staff of 481,088. Scientists and engineers total 356,088, and other technical personnel, 125,000. In 1985, there were 1,381 scientific research institutes and technical development organizations affiliated to colleges and universities, employing 28,768. [By Yang Xiaoping] [Text] [Beijing CHINA DAILY in English 12 Mar 86 p 1 HK] /6091

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APPLIED SCIENCES

STATE OF ACOUSTICS DEVELOPMENT BY YEAR 2000 DISCUSSED

Beijing WULI [PHYSICS] in Chinese Vol 14, No 9, Sep 85 pp 513-517, 534

[Article by Guan Dinghua [7070 1353 5478] of the Acoustics Research Institute, Chinese Academy of Sciences]

[Excerpt] III. The Present State of Domestic Acoustics Research.

Organized acoustics research began with the 20-year long-range plan of 1956. Since then China has worked in the various areas of architectural acoustics, noise control, ultrasonics, speech, atmospheric acoustics, hydroacoustics, electroacoustics, and musical acoustics. Some work has received national science prizes and some has won national discovery prizes and gained domestic and international recognition. Acoustics research in China is intimately tied to the national defense, the economy, and the people's livelihood; the broadening of its results has been swift, and it plays an important part in national construction.

In the area of hydroacoustics, we developed the theory of sound propagation in shallow water and the theory of deep sea convergence zones. We established sea floor acoustic characteristics research and research to apply acoustical methods toward study of ways to classify sea floor soil. We have launched study in the area of numerical forecasts of sound fields, normal wave filtration, propagation exchange relationships between normal waves and rays, remote reverberation, marine noise fields, boat noise, the relationship between gizhuang and internal waves in a sound field, absorption of sea sounds, reflections of sound by submerged objects as well as performing large quantities of hydroacoustic physical experiments. Work on shallow water sound fields has been rather creative, attracting domestic and international attention as well as capturing second prize in the national natural sciences awards.

We have developed high performance piezoelectric aggregates, sandwich polymer - piezoelectric ceramic composites as well as related absorption and damping materials. Many kinds of new types of transducers and corresponding transducer theories have also been developed.

In the area of hydroacoustic information processing, work has unfolded in polarity relations, digital multi--beams, pulse compression techniques, high speed FFT, high resolution spectral estimation as well as self adaptation

techniques. Very great advances have also been made in large scale integrated circuits and the application of microcomputers to acoustical information processing.

We have developed horizontal and vertical fish detection devices, linear stratigraphic section instruments, various sounding devices, multi-beam sounding instruments, side looking sonar, acoustic release devices, sound wave instruments, square matrix under water holography systems, all of which have seen important application.

In the area of ultrasonics, we have produced research on flaw detection, including manufacture of flaw detecting transducers and flaw detection instruments, and photoelastic displays as well as theoretical calculations of acoustic scattering fields from defects. We have produced ultrasound microscopes and optical acoustic microscopes. We have developed work on acoustic sounding of subterranean rock, macrograin metallic flaw detection, and ultrasonic oil exploration. We have developed various model ultrasonic flaw detectors, pachymeters, flow meters, and anemometers.

In medical applications we developed various ultrasound diagnostic devices for use in diagnosis, Doppler effect blood-flow meters, and there has been rich experience obtained from the application of these instruments to clinical situations. There has also been much work on applications in ultrasonic treatment, ultrasonic pulverisation of calculus, etc.

Production and theoretical research has also been done on various surface wave devices. Such devices have attained wide application.

With the development of work on fluid kinetic whistle ultrasonic homogenization, pulverisation, and atomization, achievements have been made in the preparation of fuel additives and COM (Coal-oil mixture) so that there has been very high efficiency in conserving oil.

In the area of ultrasonic factory processes, many very good results have been attained in ultrasonic cleaning, processing, drilling, welding, tin plating, cold-drawing steel pipe, etc. Very good results have also been gained from ultrasonic irradiation processing food and Chinese medicinal herb seeds. Research has also been done on transducers and amplitude rods used to perform ultrasonic factory processing.

There have also been advances in research in the areas of high frequency phonons, molecular acoustics, and ultrasonics in liquid helium.

In the area of speech, work has been done on the analysis of Chinese, including vowels, consonants, tones, and resonances. Study has begun on language resolution and the characteristics of language perception.

Computers have begun to be used to study the synthesis of Chinese pronunication. A system for language differentiation has been completed using mini and microcomputers and its identification power is rather high for monosyllabic languages.

In the area of constructional acoustics and noise control, various designs for hall acoustics have been done. Research has begun on room sound fields and second order acoustic evaluation standards. Model experiments have been set up, successfully completing quite a few acoustic fidelity designs for halls, and research has designed many kinds of sound absorbing materials and structures, acoustic dampers, acoustic enclosures, and acoustic constructions. With regard to open-air noise, there has been profound research which won the third prize in the national natural sciences awards. Noise surveys and comprehensive management have been implemented at large industrial factories. For environmental noise in cities, systematic investigatory studies have been done and standards have been proposed.

In atmospheric acoustics and geoacoustics, we have studied the laws of sound propagation in the atmosphere, engaged in the monitoring of subsonic signals from typhoons and nuclear explosions, researched and developed highly sensitive geophones, and observed pre-earthquake seismic signals.

We have researched and produced various microphones, loudspeakers, earphones, hearing aids, vibration pick-ups, electroacoustic systems, acoustic instruments, and have established a standard for measurements in acoustics. Research has also been carried out in the areas of electroacoustic theory and stereophonic theory. Sound level meters and various acoustic instruments have also been produced through research and development.

IV. Prospects for Development.

Acoustics is a science with very high applicability. For this reason, the development of acoustical sciences cannot but receive greater influence from society's direct needs than do other branches of physics. Acoustical science's contribution to society are also more direct.

Acoustics and other sciences permeate each other. The swift development and major changes in related sciences (like microelectronics and microcomputers, with new models, functions, and materials) will induce strong echoes in acoustics, greatly speeding its development. Conversely, acoustics will also have a major influence on the new revolution in industrial techniques. Developments such as fifth generation computers, the information revolution, and robotics are inseparable from acoustics.

Acoustic research in China has a solid foundation. It also has the corresponding directing power and mainstay power which are the requirements for swift development. Acoustics is the "light industry" of physics. It can develop with only a minimum of necessary equipment. From these points it is clear that acoustics will develop energetically in the future.

We can imagine that before 1990 acoustics will further develop its branches which already have foundations as well as strengthen and fill in those branches which are weak or lacking. Strenuous increases in practical research, stressing the solution to the major key problems of information science, energy resources, environment, marine exploitation, and materials such as remote sensing, sonar, language and sound information processing, language machines, ultrasonic processing and energy conservation techniques,

noise control, new model sound transmission sensory devices, ultrasonic electronics, and biomedical ultrasonics will diligently work to produce contributions to the national economy and defense. There will be continued emphasis on basic research, stress on following party theory, on the effects of ultrasonics on physical microstructures, the laws of ultrasonic transmission, reflection, and scattering, nonlinear acoustics, laws of sound transmission in the ocean, atmosphere, and through the earth, study of noise sources, and the action mechanism of sound in matter. Through diligent work to raise the standards of research every effort will be made so that by the end of this century the various major sub-disciplines in acoustics will attain international standards in research quality and areas of contribution as well as make a major contribution to the development of science in general. The general branch disciplines in acoustics will keep up with the international pace as well as satisfy domestic requirements.

From the viewpoint of science itself, we ought to stress development of ultrasonics, hydroacoustics, noise control, and speech and fill in the deficient areas of bioacoustics and psychoacoustics and correspondingly expand constructional acoustics, atmospheric acoustics, electronacoustics, and musical acoustics.

On the basic research foundation we will enhance research and development of instruments and equipment in the area of acoustics and strive in a short period to be able to meet domestic needs and attain competitive power in international markets.

Major Tasks:

(1) Noise Control: Henceforth we should emphasize airflow, vibration radiation, shock, and other noise production mechanisms, study methods of quality and fault [control] with sound source positioning and the use of noise and vibration monitoring equipment, study new methods and techniques to control sound, and study standards and legislation concerning environmental noise.

(2) Psychoacoustics and Bioacoustics: We ought to stress study of the auditory nervous system, study of the process of how the mechanism of a sensory cell generates a nerve pulse, achieve breakthroughs on how the aural nerve codes are transmitted to cerebral nerves, and the problems of cerebral nerve perception.

(3) Speech: With the development of computers and large scale integrated circuits, artificial synthesis of language and machine differentiation of language have advanced rapidly. The problems facing these areas at present are expansion of vocabulary and establishment of a system that differentiates continuous speech regardless of speaker. Synthetic speech also needs to be made more natural. Deeper study of the properties of language and of human perception of language is needed. Research work in the area of the characteristics of Chinese and the properties of the perception of Chinese ought to be completed by our scientists. This is a duty we cannot shirk. There will be even greater breakthroughs in efforts to use fifth generation

computers to implement human-machine language in the pursuit of dialogue and language transcription.

(4) Ultrasonics: Future study will concentrate on the laws of transmission, reflection, and scattering of ultra sound in solids. At the same time, we will develop various new flaw detection techniques (including acoustic emission techniques.) On the one hand, we want to resolve the defect detection [procedure] for different bodies (like coarse crystals and the human body.) On the other hand, we want to proceed with more microscopic observations (such as ultrasonic, optical-acoustic, and electron-phonon microscopic examination,) and also use computer assistance to get greater quantities of information, achieve automation, and obtain quantitatively determined and imaged results.

(5) Hypersonics: Focus here will be on study of the mutual effects of phonons and the microstructure of matter. This will provide a means to help understand the microscopic structure of matter.

(6) Ultrasonic Electronics: Development of new theory and new equipment will provide ways for processing of information in high frequency electronics.

(7) Applications of Ultrasonics to Matter: Emphasis will be on expanding areas of application, seeking out new applications, and effects in the area of energy conservation, such as ultrasonic preparation of COM fuel, oil additives, and liquefied coal, will result in achievements. With the disciplines of physics, chemistry, and biology, there will be close cooperative study of the mechanisms of ultrasonic applications including the mechanism of application to living matter.

(8) Atmospheric, Marine, and Terrestrial Sound Transmission and Applications: For these purposes we will study the laws of propagation in oceans, methods of using changes in sound waves for remote sensing of marine environments, such as marine acoustic tomographic techniques, and sea floor geomorphological acoustic telemetry. We will study remote measurement and close range high resolution soundings with imaging techniques for communication, orientation, dynamic orientation, and inlet reentry. There will be study of the corresponding techniques of code processing, transducing materials, and transducers. There will be an opening up of study of techniques of deep stratigraphic sensing, three dimensional seismic exploration, and petrographic methods.

(9) Electroacoustics: There will be increased research on new electroacoustic devices, such as silicon chips, polymer films, and optical microtransducers to form integrated sensors. Research on high quality laser recording, digital recording, reproduction, and transmission systems will take qualitative acoustic fidelity to new heights in order to fulfill the cultural needs of the people.

This report sought out the views of many domestic specialists and professors to whom we extend our thanks.

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HEALTH CARE IMPROVES FOR WOMEN, CHILDREN

OW081918 Beijing XINHUA in English 1911 GMT 8 Mar 86

[Text] Beijing, March 8 (XINHUA)--Mothers and children in China are receiving much better health care than a decade ago.

According to a report in today's "Health News", there are 3,055 mother and child care centers in the country, with a total of 30,000 beds. Together with the numerous mother and child care groups and rural doctors and specialized hospitals, it has formed a vast network to take care of women and children.

Staffed by more than 60,000 medical personnel and health workers, the centers and local hospitals have managed to reduce the death rate of Chinese expectant mothers and lying-in women from 150 per 10,000 in the early 1950s to the present five per 10,000, and that of perinatal babies to less than 24 per thousand, the paper said.

China attaches much importance to the health care of women above the age of 16 and children under 15, who account for two-thirds of China's total population.

The principle of putting prevention first is being implemented throughout the country. Health care and consulting services are extensively offered to women before and after marriage and, for expectant mothers, systematic health care and perinatal care are encouraged. Regular health checks, especially examination of cancers of the breast and uterine cervix, are carried out regularly in both cities and the countryside.

The paper said that efforts are being made in city hospitals to probe into the factors causing death of expectant mothers and perinatal babies in order to reduce the mortality rate even further.

The paper said that medical authorities are encouraging breast feeding and 21 provinces, municipalities and autonomous regions are conducting surveys and spreading the practice.

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LIFE SCIENCES

BRIEFS

TIANJIN ANIMAL BREEDING--Tianjin, Jan 8 (XINHUA)--Three breeds of experimental mice up to international standards have been bred by Tianjin scientists. In the past, some Chinese medical research findings failed to get recognition in the past for using substandard experimental animals. The three breeds, named "Jinbai No 1", "Jinbai No 2" and "615", have been recognized by the International Committee on Standardized Genetic Nomenclature for mice. They were developed by the Tianjin Medical College and the Chinese Academy of Medical Sciences. China has imported seeds of laboratory animals from Britain, Japan and the United States since 1982, said Lu Yuezeng, director of the Academy's Medical Laboratory Animal Center. It has spent 15 million yuan building laboratory animal centers and breeding farms since 1983. The country now has six centers and seven farms. Major medical colleges, hospitals and institutes have their own laboratory animal departments, Lu Yuezeng said. The largest animal center, in Tianjin, produces an annual average of 3 million animals. [Text] [Beijing XINHUA in English 0749 GMT 8 Jan 86 OW] /6091

SHANGHAI INSTITUTE SYSTEM TO TEST CELLS--Shanghai, Feb 2 (XINHUA)--A microscopic system used to test and record the changes of cells of organisms in ultra-low temperatures has been developed at the Shanghai Mechanical Engineering Institute. The system, the world's sixth, can create an environment with a temperature down to minus 196°C, an institute spokesman said. It is fitted with precision video recorders and cameras to record the changes of the cells being tested. Shanghai scientists have used the system to study the destruction of cancerous cells and the preservation of human sperm, bone marrow cells, red blood cells and carp embryos. The results were "satisfactory", according to the institute spokesman. [Text] [Beijing XINHUA in English 0209 GMT 2 Feb 86 OW] /6091

HUNAN UNIT STUDIES CHROMOSOME DISEASES--Changsha, Feb 11 (XINHUA)--China has found that the rate of abnormal chromosomes in its new-born is 7.3 per thousand. Experts here said today the rate was determined by surveys of 3,415 babies by the research section on cell genetics at the Hunan Academy of Medical Sciences. They noted that the section has also discovered 48 "exceptional cases" of chromosome diseases which "have never been reported in the world before." The research section is now able to diagnose 95 types of chromosome syndromes and more than 300 kinds of abnormal chromosome diseases. It has offered consultation service on genetics to over 10,000

people in the past five years and has conducted chromosome examinations of 2,200. Its work avoided the birth of 109 babies with possible congenital abnormalities, the experts noted. The research section has also provided medical treatment for 119 patients with chromosome diseases, they added. [Text] [Beijing XINHUA in English 0638 GMT 11 Feb 86 OW] /6091

JIEFANGJUN BAO NOTES PLA HOSPITAL RESEARCH--Nanjing, Mar 8 (XINHUA)--Doctors here have discovered abnormal chromosomes which are thought to cause miscarriages and birth defects, according to the Liberation Army Daily. Abnormal karyotypes--the chromosomal constitution of the nucleus of a cell--cause 88.8 percent of abortions and birth defects, 16 times the rate when the chromosomes are normal, according to the experts. Doctors at the General Hospital of the Nanjing Military Area Command of the People's Liberation Army said if a woman is found to be a carrier of the abnormal chromosomes possible miscarriages can be avoided and, with careful medical guidance, it is possible for her to bear a healthy child. The hospital has opened a clinic to offer consultancy on this matter. [Text] [Beijing XINHUA in English 0748 GMT 8 Mar 86 OW] /6091

ELECTRONIC DEVICE HELPS PARALYSIS VICTIMS--Beijing, Mar 10 (XINHUA)--Chinese scientists have developed an electronic device to help patients suffering from hemiparesis (paralysis affecting one side of the body) to walk, according to the People's Railway Journal. A hospital attached to the Third Engineering Bureau of the Railway Ministry has successfully treated 80 patients with the new device, the journal reported. Developed by the Third Military Medical College based in Chongqing and the Ministry of Astronautics, the device is effective for 90 percent of hemiparesis cases caused by cerebral thrombus (vascular obstruction caused by a clot) or encephalemia (congestion of the brain) and some sequelae of infantile paralysis, according to clinical experiments. The device, looking like a small radio set, helps a patient to contract the extensor (muscle that extends a joint) of the leg and enable the patient to walk, according to doctors. At later stage, the device can aid a patient to correct the limb's direction, the paper reported. [Text] [Beijing XINHUA in English 0245 GMT 10 Mar 86 OW] /6091

CSO: 4010/1031

ENVIRONMENTAL QUALITY

GUANGXI CITY WORKS TO FIGHT POLLUTION

OW280916 Beijing XINHUA in English 0908 GMT 28 Feb 86

[Text] Nanning, February 28 (XINHUA)--Crowds of birds have returned to the shade trees of Guilin, one of China's most beautiful cities, as a result of anti-pollution efforts, a city official said today.

Guilin, in southern China's Guangxi Zhuang Autonomous Region, is noted for its scenery and crystal clear Lijiang River. But the city's rapid industrial development has polluted its air--causing, among other problems, the exodus of most of its birds more than five years ago.

To fight the pollution, and to protect Guilin's most attractive sights, China's central government has allocated 44 million yuan to city officials for local anti-pollution projects.

With the backing of the central government, city officials have shut down or renovated 69 factories and workplaces that were creating air and water pollution and equipped more than 200 industrial boilers with anti-pollution devices.

The city has protected underground water sources by diverting about 10 million cubic meters of industrial waste water through treatment channels.

By dredging silts, the water quality of the Lijiang, Taohua and Nanxi Rivers has been greatly improved.

The city has also planted 2.39 million trees and 53 flower beds and covered 130,000 square meters of land with lawns since 1981--and as a result many of the self-exiled birds have returned.

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ENVIRONMENTAL QUALITY

HUNAN INTRODUCES RURAL ENVIRONMENTAL PROTECTION

OW080832 Beijing XINHUA in English 0652 GMT 8 Mar 86

[Text] Changsha, March 8 (XINHUA)--Hunan Province in central China has implemented protection programs to save trees, birds, frogs and snakes, and clean-up programs for cleaner water and air.

The province conducted a survey among 340,000 industrial enterprises in rural areas. Those guilty of polluting the air and water were required to control their emissions within a certain period of time.

While the majority have complied with the clean-up measures, 700 factories have been closed, according to the provincial bureau in charge of rural enterprises.

Building biogas fermentation pits is another effective measure for controlling pollution, since human excrement and animal droppings have been sterilized during the process of fermentation which provides additional fuel.

In Nanxian County, some villagers use the biogas to heat greenhouses for cultivating seedlings, and apply the residue from the biogas pit for fertilizing soil and gardens. The average income of those families reached 4,200 yuan last year, 50 percent more than in 1984.

About three million rural families, or one-third of the total in Hunan, use fuel-saving stoves, thus alleviating the shortage of firewood and reducing the felling of trees. Denudation was the main reason for soil erosion in this province as well as in other parts of China.

The provincial government has also designated a "bird-loving festival" and "bird-loving week" at the beginning of each year, when newspapers, radios and televisions disseminate knowledge about birds. The province has set up 23 nature reserves.

To protect frogs and snakes, the province has banned their sale at market. According to statistics from Changsha and Zhuzhou, 11,000 kilograms of live frogs and 4,000 snakes were confiscated at the markets and returned to the fields and mountains.

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Solar Energy

PREPARATION OF SnO_2 FILM BY EVAPORATE-THERMAL DECOMPOSITION FROM AQUEOUS SOLUTION AND CHARACTERIZATIONS OF ITS OPTICAL AND ELECTRO-CONDUCTIVE PROPERTIES

Beijing TAIYANGNENG XUEBAO [ACTA ENERGIAE SOLARIS SINICA] in Chinese Vol 6 No 4, Oct 85 pp 405-411

[English abstract of article by Li Chunhong [2621 2504 7703] and Wang Lan [3769 1526] of Changchun Institute of Applied Chemistry, Chinese Academy of Sciences]

[Text] In this paper a new preparation method for SnO_2 transparent electro-conductive film atmospheric evaporation-thermal decomposition from aqueous solution is presented. Some of its properties are characterized.

It is suggested that with this method it is simpler to prepare the transparent electro-conductive film of SnO_2 on surfaces of any shape when compared with a number of known methods. The results obtained with XDS, AES and ESCA indicate that an oxygen-defective SnO_{2-x} film with n-type semiconductor is formed during the processes just as in spray thermal decomposition.

The SnO_2 films possess properties of antireflection and transmission in visible range, and reflection in infrared range. In addition, the SnO_2 films inhibit the effects of thermal radiation. These functions are useful in solar energy development.

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FIRST EPITAXIAL FIRM BEGINS PRODUCTION

OW300413 Taipei CNA in English 0237 GMT 30 Dec 85

[Text] Taipei, Dec. 29 (CNA)--The first epitaxial manufacture in the Republic of China went into operation Saturday in the Hsinchu science-based industrial park in northern Taiwan.

A spokesman for the company, Episil Technologies Inc., said domestic manufacturers using epitaxials to produce semiconductor components will no longer depend on foreign suppliers because Episil's production can fully meet domestic requirements.

Epitaxial, an indispensable raw material in the manufacture of power transistors and integrated circuits, will become more and more important in manufacturing CMOS [complimentary metal oxide semiconductor] very large-scale integrated circuits, because it can solve the problem of latch-up, he said.

Previously, the spokesman said, ROC manufacturers have to depend on foreign exporters to supply epitaxials and, therefore, the shipments of this material are unstable and usually take a long time. It is also inconvenient for domestic importers to identify its specifications and to offer after-sale services.

With Episil fully supplying domestic requirements, domestic manufacturers may lower their production costs by reducing stocks and shorten their research and development cycles, he added.

Episil is scheduled to produce 20,000 to 30,000 pieces of epitaxial monthly at the first stage and will increase its production capacity later on.

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CSO: 4010/1032

CABINET APPROVES VLSI PROJECT; TASK FORCE NAMED

OW161213 Taipei CNA in English 1022 GMT 16 Jan 86

[Text] Taipei, Jan. 16 (CNA)--The Executive Yuan Thursday approved a proposal to set up a very large-scale integrated circuit [VLSI] plant in the country.

Premier Yu Kuo-hwa also appointed a five-member task force to take charge of preparatory work for the proposed plant. The five are Economics Minister Lee Ta-hai; Finance Minister Robert Chien; Chao Yao-tung, chairman of the Council for Economic Planning and Development; Chen Li-an, chairman of the National Science Council; and Chang Chung-mo, director of the Industrial Technology Research Institute.

Premier Yu said that the project runs a risk. "But in order to promote the technological development and industrial upgrading," he stressed, "we should take the risk."

According to preliminary estimates, the proposed VLSI plant will cost about U.S. dollar 207 million. Of the amount, 30 percent, or U.S. dollar 62 million, will be loans from banking institutions. Government funds will account for 48.3 percent of the total equity; foreign capital, 27.6 percent; and the remaining 24.1 percent will be from local private investors.

All the capital must pay in four installments; 40 percent of their shares each in 1986 and 1987 and 10 percent each in 1988 and 1989. The Bank of Communications will collaborate with other local banks to supply the loans.

In picking a foreign partner, the cabinet will give priority to the one who can help promote development of the local electronic industry.

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TAIWAN

EXECUTIVE YUAN APPROVES VLSI JOINT VENTURE

OW180323 Taipei CNA in English 0239 GMT 18 Jan 86

[Text] Taipei, Jan. 18 (CNA)--The Executive Yuan has approved the very-large-scale-integrated circuit (VLSI) project proposed by the Ministry of Economic Affairs (MOEA) that enters the government into a U.S. dollars 207 million joint venture with private firms, informed sources said.

In approving the project, Premier Yu Kuo-hwa said that despite the large risks involved, the government will accept the challenge of the investment and lead the nation's industrial transformation.

The premier also appointed five ranking officials to an ad hoc committee that will supervise the project's implementation.

The appointees are: Chao Yao-tung, chairman of the Council for Economic Planning and Development (CEPD), Chen Li-an, chairman of the National Science Council, Economics Minister T.H. Lee, Finance Minister Robert Chien, and Morris Chang, president of the Industrial Technology Research Institute.

The VLSI project, as proposed by the MOEA, requires a total capital of U.S. dollars 207 million for setting up a manufacturing company. Of this, equity capital will amount to U.S. dollars 145 million, and loans, U.S. dollars 62 million. Of the equity capital, 48.3 percent will come from the government and the balance from foreign and local private investors.

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SYNCHROTRON CENTER PLANNED FOR NORTHERN TAIWAN

OW030325 Taipei CNA in English 0256 GMT 3 Feb 86

[Text] Taipei, Feb. 1 (CNA)--The first radioactive synchrotron center in the Republic of China will soon be built near the Hsinchu science-based industrial park, some 100 kilometers south of Taipei, an official with the Executive Yuan said Saturday.

The official, who preferred anonymity, said the decision to build the synchrotron center was made in a meeting of the Synchrotron Research Center Supervisory Board presided over by Dr. Yuan Chia-liu, chairman of the board.

Also present at Saturday's meeting were K.T. Li, minister without portfolio, Y.S. Tsiang, national policy advisor to the president, Yen Chen-hsing, chairman of the Atomic Energy Council, Chen Li-an, chairman of the National Science Council, and Dr. Samuel Ting, a Chinese-American Nobel Prize winner in physics.

Participants in the meeting also decided to immediately begin the design for the office building for the center.

Before the new building is completed, the staff of the board will work temporarily at the precision equipment center in the science park in Hsinchu, the official said.

The official did not disclose who will be in charge of the construction project, saying only that several French experts have expressed interest in this job.

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